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Report on the Geological Structure and Mineral Wealth of the Salt Range in the Punjaub; with Maps, Sections, &c.—*by* Andrew Fleming, *M. D., Edin. Assistant Surgeon, 4th Regt. Punjaub Cavalry. In charge of the Geological Survey of the Salt Range in the Punjaub. Season* 1851-52.

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(Continued from Page 279.)

Tertiary Eocene Rocks, Brown Calcareous Sandstone, Nummulite, Limestone, Marls and Alum Shales with Lignite.

A band of claystone, in some places highly ferruginous and in others nearly as white as pipe clay, seems to mark the base of this formation. It has exactly the appearance of the ferruginous claystones described as occurring in the Oolite shales, and as it may be seen occasionally passing into black bituminous shales which are in rapid process of decomposition, its origin is doubtless identical.

Resting on this is an incoherent greenish brown calcareous sandstone, which east of Kuttha is devoid of organic remains. At this place, however, it becomes more calcareous, contains a few nummulites and a considerable number of gasteropodous molluscæ. On proceeding westward to Moosakhail, the bed becomes a coarse arenaceous limestone, and abounds in fossils similar to those which occur throughout all the rocks of the nummulite limestone series, none of those characteristic of the formations inferior to it having been detected.

To this sandstone there succeeds a deposit of very varying thickness of dark bituminous alum shales containing irregular beds and

films of a coal having all the characters of a lignite. The shales contain much pyrites, and large and small crystals of Selenite are abundant throughout them. In many places they are undergoing rapid decomposition from the oxidation of the pyrites. In the neighbourhood of Kalibagh the chemical action is so violent, and often produces such intense heat, as to cause the combustion of the shales and their conversion into red claystone. In some of the old shale pits (from which the alum shales are dug) the combustion is most violent, and volumes of smoke issue with considerable force from their mouths charged with the vapours of sulphurous acid which taiuts the air all around. On tracing the shales upwards they become arenaceous and marly, and pass by a coarse yellow marly limestone full of nummulites and other shells into a compact grey limestone, the lower beds of which appear as if made up of rounded masses of the same limestone arranged in horizontal layers and cemented in a calcareous paste. This appearance has probably been produced by the breaking up of the deposit shortly after its formation, aud the subsequent recementing of the fragments by the infiltration of calcareous mud.

Both the limestone and the cementing paste abound in nummulites, fragments of Echinidæ, &c. Above, the limestone becomes of a grey argillaceous character and when bruised emits a fœtid smell. It gradually passes into blue marls which are succeeded by an upper deposit of bituminous alum shales. Argillaceous limestone beds then follow of a light grey colour, having a striking resemblance to chalk, and are succeeded by a thick deposit of a very compact light grey limestone in which irregular shaped masses and rounded nodules of flint closely resembling those found in chalk are abuudant. They are particularly so, in the district between Nummul and the north side of mount Likesur, and were there collected in large quantity by the Sikhs for the preparation of musket flints. They seem to be arranged generally in layers, and are of a dark grey or black colour, their surface being covered with a white chalky crust, and sometimes with an incrustation of peroxide of iron, which, both in nodules and in small veins, is of frequent occurrence in the limestone. These are apparently decomposed pyrites.

The limestone in many places seems formed entirely of the shells

of Foraminiferæ, especially of nummulites which are most apparent in the weathered surface of the rock, a freshly fractured surface often presenting no trace of them.

It is very hard but brittle, and presents a splintery conchoidal fracture. The rock is invariably traversed by deep fissures and cracks indicative of its having suffered severely from the commotions to which the Salt Range has been subjected.

It is a very fine limestone dissolving rapidly in muriatic acid, and with the separation of a small quantity of flocculent silica.

The nummulite limestone formation west of Pind Dadun Khan forms generally the top of the escarpment of the range, appearing between that place and Kuttha and in the Chichalee Range, in precipitous cliffs several hundred feet high, which weather of a white colour and in the distance have a strong resemblance to chalk.

Owing to the rapid disintegration of the shales in the cliffs, the limestone becomes undermined, and huge masses of the rock thus become detached, and strew with their debris the steep sides of the hills. To the north of the escarpment of the range in its central part, the nummulite limestone in a great degree conceals the inferior rocks, and is generally distributed over the ridges, table-lands and valleys which intervene between its north and south sides. Its strata are, however, very much broken up, and in all the deep ravines its relation to the inferior rocks may be observed.

The thickness of the formation varies much, but when well developed, it cannot be less than a thousand feet; in many places it is much more.

In this formation the limestone as a source of lime is very valuable, being more generally burned, than any other limestone, in the Salt Range. It is never quarried by the natives who have only to collect the boulders of it which are strewed in great abundance all along the foot of the hills.

From its brittle splintery character, and the difficulty of obtaining blocks of it of any size, it is not adapted for a building stone.

The minerals we shall notice as occurring in this formation are the alum shales as a source of alum, and thin enclosed beds of lignite, petroleum and mineral sulphur.

Alum shales are extensively mined at Kalibagh, and at Kathee in

the Chichalee pass. At Kalibagh the principal workings are at a place called Chatab on the north-east side of the Kalibagh hill, above the Soan Nullah and about a mile from the Indus opposite Marie. Here the lower alum shales are fully two hundred feet thick, and are surmounted by a high scarped precipice of nummulite limestone. Regular shafts are sunk in the shale or "Ral" as it is called by the natives, to depths varying from two or three hundred feet. After being carried out of the pits by men and boys, it is packed in coarse blanket bags and conveyed on bullocks or donkeys to the alum works at Kalibagh, where the miners are paid at the rate of one rupee for from thirteen to seventeen maunds, according to the quality of the shale delivered. From the incoherent character of the beds, and the rude way of mining them, accidents to the miners are of very frequent occurrence, who, from the sulphureous air they are obliged to breathe in the pits, and the laborious nature of their employment, have a most sickly and emaciated appearance.

In the town of Kalibagh there are generally from twelve to fourteen kilns for burning the shale, to each of which the necessary arrangements for the preparation of alum are attached. In 1852 only twelve kurrahs or evaporating pans were in use, one being attached to each kiln.

In preparing the kiln a layer of brushwood (generally tamarisk jungle which abounds on the banks of the Punjaub rivers) is spread on the ground to an extent varying according to the size of the one to be constructed. On this a layer of the Ral or Shale in fragments is deposited to the depth of about a foot, to which succeeds a second layer of brushwood, and then another of shale, a quantity of wood being added according as the shale is more or less bituminous. When several of these layers have been arranged, the kiln is set on fire from below, care being taken that the combustion is not too rapid, which from time to time is moderated by sprinkling water on the shales. The kiln being well lighted fresh layers of shale and brushwood are added, and when the whole has attained the height of thirty or forty feet it is left to burn, six or eight months being sufficient to effect the thorough decomposition of the mass, which when completed has changed from a black to a brick red colour in consequence of the oxidation of the pyrites. Its surface is covered

with an efflorescence of alum containing a large proportion of sulphate of iron or green vitriol derived from the mutual reaction of the clay and iren pyrites in the shales, which from containing thin films of coal are admirably adapted for alum manufacture. Close to the kiln, and on a level a little below its base, there is a baked clay vat 12 feet square by $1\frac{1}{2}$ feet deep. Into this a portion of the burnt shale is thrown and treated for several hours with water which rapidly acquires a dark brown colour. When a saturated solution of the soluble matter in the shale is obtained, it is drawn off from the vat by an aperture in its side (which during the lixiviation of the shale is stopped by a plug) into another vat of similar size, but on a lower level. Here the crude alum liquor is allowed to deposit any mud which it may contain, and is then run off into a third but smaller vat on a still lower level, when it is again allowed to deposit any remaining impurity. From this it is transferred into an iron evaporating pan or "kurrah" where it is rapidly boiled and mixed with a brownish impure salt called "Jumsan" from which it derives the alkali necessary to convert the crude alum into an alum of commerce. When a proper quantity of this has been added, which is judged of from the apparance of the liquid, the whole is allowed to settle and the clear brown alum solution removed into vats about nine feet long $5\frac{1}{2}$ broad and about $1\frac{1}{2}$ feet deep, a series of which are arranged beneath a shed close to the evaporating pan. In these the solution, which is concentrated to a point a little short of that of crystallization, is allowed slowly to crystallize for several days. During that time small alum crystals are formed of a slightly pink colour devoid from the impure mother liquor which contains a quantity of chloride and sulphate of iron. When a considerable crop of alum has separated, the crystals are removed from the vat, slightly washed with cold water on a sirkee frame, and allowed to dry. These are afterwards fused in an iron pan, in their own water of crystallization and when in a fluid state are removed into large conical earthen jars, one foot eight inches deep, the same breadth at the shoulder, and six inches wide at the mouth, where for eight or ten days the alum is allowed to crystallize. At the end of this period a hole is made in the mass of alum, which is generally hollow in its interior, the gurrah inverted, and the uncrystallized alum liquor

allowed to escape. The gurrah is then broken and the alum, moulded to its form, is ready for sale and exportation.

The following is an estimate of the expence at Kalibagh per diem of keeping one kurrah or evaporating pan, &c. at work. Payments are made in a 13 anna Rupee for the Company's maund.

40 maunds of shale, ... Rs.	3	0	0
Wood to burn this and evaporate the alum liquor,	4	8	0
5 maunds of Jumsan, ...	3	0	0
7 Coolies, ...	1	4	0
Sundries, ...	0	8	0
Water-fee paid to Mulik Ulla Yar Khan, ...	0	1	6
Fee to Mulik of Kalibagh, ...	0	4	0
	12	9	6
Difference between 13 anna Rupee and Co.'s Rs. in Rs. 12-9	2	5	0
Total Expence, Co.'s Rs.	10	4	6

The above expenditure yields a return of three maunds and ten seers of alum, the value of which at Rs. 3-4 per maund is Co.'s Rs. 10-9. Assuming the above to be correct (and we give it exactly as stated to us) the owner of each kurrah will only have a clear gain of As. 0-4-6 per diem. At Kalibagh however as the Mulik of the place Ulla Yar Khan is sole proprietor of five out of the twelve kurrahs at work, and as he generally pays his workmen and miners in flour, clothes, &c. instead of in cash, his profits are doubtless considerable. He moreover levies a tax of Rs. 2 on every camel load of alum removed from Kalibagh.

Alum is manufactured at Kalibagh for ten months in the year and about 12000 maunds (8571 cents) is annually prepared, which at Co.'s Rs. 3-4 per maund will yield a return on the spot of Rs. 39,000.

At the Kathee alum works in the Chichalee pass, the expenses are considerably less, and the alum prepared, though of equally good quality, is sold at the rate of Rs. 2-8 per maund.

They are owned by a Joint Stock Company of eight members who are chiefly residents of Esakhail on the Indus, annexed is the expenditure for one kurrah per diem, of which there are eight.

60 maunds of shale, ... Rs.	1	0	0
Wood to burn this and evaporate the alum liquor,	4	0	0
3 maunds of Jumsan, ...	2	8	0
9 Coolies' wages, ...	1	12	0
Fee for right to water taken by the Lumberdar of Esakhail, ...	0	6	0
Sundry Expenses, ...	1	0	0
Rupees	10	10	0
Difference between 13 anna Rupee and Co.'s Rs. in Rs. 10-10, ...	2	0	0
Total Expence, Co.'s Rs.	8	10	0

From the above 4 Co.'s maunds of alum are produced, the value of which at Rs. 2-8 per Co.'s maund would be Rs. 10, which gives a clear profit to each kurrah per diem of Co.'s Rs. 1-6. About 10,000 maunds are annually prepared.

The Kathee alum-works are, we believe, of recent origin as compared to those of Kalibagh, where the manufacture has been carried on in the same way by Mulik Ulla Yar Khan's ancestors for eight or nine generations. Between the owners of the new and old alum-works there is considerable jealousy, and as the former can obtain the materials for the manufacture at a cheaper rate, they are likely to damage the monopoly that formerly existed at Kalibagh, in the days when the Mulik of the place was looked upon as a petty king. It has been already stated that the substance from which the alkali of the alum is derived is a brown salt called "Jumsan," which occurs as an efflorescence on the jungle soil of the plains which skirt the Salt Range and Chichalee Hills and, indeed, is of common occurrence in all grass jungles and waste grounds throughout the Punjab. It is called "kullur" by the natives, and from it "Jumsan" is obtained by treating the former with water and drying up its filtered solution in shallow earthen vessels exposed to the sun. This on analysis proves to be a mixture of sulphate of soda with common salt, with varying proportions of carbonate of soda; its quality depending chiefly on the amount of sulphate of soda which it yields.

In all the commercial European alums as far as we can ascertain the alkaline base is potash or ammonia, the former alkali being characteristic of British alums while the latter occurs in those of France. In the alum of Kalibagh, however, soda forms the alkaline base, a fact which the addition of "Jumsan" to the crude alum liquor first led us to suspect, and which an analysis of the alum subsequently confirmed. A soda alum has hitherto, we believe, been known only as an interesting chemical preparation, but previous to 1848, we are not aware that it had been noticed as a staple article of commerce in the N. W. Provinces of British India.

Considering the coarse apparatus in which it is prepared, its purity is astonishing. It effloresces considerably on exposure to the air, and has a slight pink colour arising from the presence of a little iron which strikes a blue colour with yellow prussiate of potassa, and only contains a trace of muriate of soda. Although alum is only manufactured Trans-Indus, alum-works might, we believe, be established with advantage in the Bukh ravine between Mosakhail and Nummul, as there the alum shales are of considerable thickness, and wood and water could be obtained in abundance. In other parts of the Salt Range the alum shales are too inaccessible and their thickness too small to be profitably worked as a source of alum.

Lignite or Salt Range Coal.

Throughout the Salt Range from Jelalpoor to the Indus and in the Chichalee Range, irregular seams of lignite, having, in many places, the aspect of good bituminous coal, may be observed imbedded in the lower alum shales. Lignite also occurs in the upper shales but in too thin films to be of any use as a fuel.

We shall notice the different localities where we have observed the lignite deposit proceeding from east to west.

Baghanwalla. This coal locality was first brought to the notice of Sir Henry Lawrence by Lt. Robinson, Bengal Engineers, who forwarded samples of it to Lahore in the Autumn of 1847. From these we made an analysis, the results of which, along with a few remarks on the general characters of the coal, were laid before the Asiatic Society of Bengal in February 1848.

Baghanwalla is a small village on the south side of the Salt Range, about ten miles west of Jelalpoor, and about eight miles from the right bank of the Jhelum. The coal seam occurs in a ravine about three miles north-east of the village among the hills and at an elevation of about one thousand feet above the plain. The access to it is by a narrow path, rather difficult and steep, but over which bullocks can travel, if moderately loaded. The nummulite limestone at this point rests on the upper red sandstone formation, and a burnt clay sandstone passing into a baked white quartzose sandstone of a few inches in thickness, marks the base of the deposit. Beds of greenish yellow marl, about a foot thick, follow, which gradually pass into sandy bituminous shales eighteen feet thick inclosing the lignite seam, on which rests a grey nummulite limestone seventy-five feet thick, the lower strata of which are marly, of a yellow colour and full of shells of a species of Ostrea and nummulites. On this limestone a thick series of miocene grey sandstone grits and red clays reposes conformably, all the strata dipping to the N. N. W. at an angle of from 40 to 45.° (See section No. 5.)

The coal seam though it may be traced on either side of the ravine where the above section was taken, for about a mile, does not present an uniform thickness as exposed on its out crop. On digging into the seam to the depth of several feet, we obtained about three feet of good coal, and about two feet of coal alternating with films of sandy shale which latter in many places seems developed at the expense of the coal which is extremely brittle, so much so that fully one-eighth falls to powder in extracting it. It loses this character, however, to some extent on digging into the seam, but we fear at whatever depth it might be mined, it never would have the solidity of genuine coal.

In a few hours two or three coolies turned out eight or ten maunds of fair coal, which bore carriage on bullocks over the hills to Baghanwalla pretty well; a camel load of it was subsequently forwarded to Lahore.

That several thousand maunds of a good fuel could be obtained from this locality at a moderate cost, I entertain no doubt, but the question as to its yielding a supply for any length of time can only be decided by sinking an experimental shaft or gallery into the

seam from its out crop and working along its strike. This we had neither time for, nor the means of effecting. In sinking such a shaft, considerable annoyance would be experienced from the amount of debris and the incoherent nature of the overlying strata in the cliffs above the coal. The high inclination too of the beds, and the consequent liability to have any shaft sunk in them filled with water after heavy rain, are very serious obstacles to working the coal successfully, even supposing the seam preserves a contiuuous thickness for any distance, which we are very much disposed to doubt.

Should government determine on making attempts to mine the Salt Range Coal, we strongly recommend that this locality be fixed on for the purpose, as it is the only one where any hope of success can be offered.

Drengun. On the north side of this mountain and to the west of the path leading from Besharut to Chooa Gunj Ali Shob, lignite of a similar character and in a similar position occurs, but from exposure to atmospheric influence, it is soft and crumbles into a brown dust in the hand. In a ravine of most difficult access about two hundred yards west of the path, highly bituminous shales about one hundred feet thick are exposed, dipping under nummulite limestone to the north north-west at an angle of 70°; in these two or three seams of tolerably good coal were found, the thickest of which was only eight inches. Ou tracing these, however, for any distance they seemed all to thin out into mere films in the shale.

As the Drengun coal is evidently an extension northwards of the Baghanwalla seam, a shaft sunk through the nummulite limestone on the table land of Besharut would doubtless reach it, but the expense of sinking a shaft through the hard limestone would be very considerable, aud would in all probability not be repaid by obtaining a supply of coal, of any consequence.

Keurah. About a mile north-east of the salt-mine village of Keurah near Pind Dádun Khan, and near a tank known under the name of Ruthlum, a mass of nummulite limestone forms a rounded hill in a ravine, at the foot of which bitumiuous shales occur, from which in 1848 we obtained specimens of coal, from a seam about two feet thick, resting ou blue clay. Iu 1849, five huudred maunds of coal were mined from this locality, and sent to Jhelum for the use

of the "*Conqueror*" steamer, in the month of July. This seems quite to have exhausted the supply, as when we lately visited the locality we could only find nests of lignite in the shales, which was so soft and powdery, that it was impossible to procure even a specimen. The nummulite limestone formation at this point, and indeed all the rocks, are much disturbed, and the mass of nummulite limestone with the shales is evidently a portion, which has been detached from its connection with the regular bed, and got thrust under some broken up beds of Devonian sandstone, which may be seen in the hills above overlying the nummulite limestone.

Pid. This locality is to the west of the direct path from Kurrah to Chooa Seydun Shah. The shale beds lie under a cliff of shattered nummulite limestone due south from the village of Pid, and between that village and Taber. The access to the locality is difficult, and the coal occurs in two seams, the lower one of which is in some places two feet thick, and separated from the upper which varies from one to three feet by shales of about a foot in thickness. From extensive spontaneous decomposition which the shales have undergone, the coal is for the most part charred and brittle, and is encrusted with yellow alumimous earth. In some places the shales have been burnt into a white claystone which is blotched occasionally by peroxide of iron. The brown calcareous sandstone too on which the shales rest here and there presents a baked and whitened appearance, resulting from the heat to which it has been subjected during the combustion of the shales.

The coal is of inferior quality to that of Baghanwalla though evidently part of the same deposit. As the cliff on which it occurs is covered by so much debris, we were unable to dig any depth into the seam, so as to obtain specimens which had not been subjected to the influence of decomposition. Where the seam crops out, it is at least two thousand feet above the plain, and is in too inaccessible a locality ever to be worked to advantage. By mistake in our Report of 1848 we called this coal locality Ruttipind.

Demdhote. In a ravine about five hundred yards west of this village and under the high escarpment of the Salt Range, a mass of nummulite limestone which has evidently been detached from the escarpment, forms a small rounded hill, at the foot of which some

lignite in a seam about two feet thick crops out. As this is only a detached portion of the regular deposit, it is of no importance, except as proving the extension of the coal seams along the range.

Mukrach. We have seen coal under detached masses of nummulite limestone in the hills above the salt-mine village, but the regular shale bed is covered in the escarpment where we examined it, by a great quantity of debris.

Noorpoor. Under the high cliffs of nummulite limestone below Noorpoor, the shale beds are distinctly seen, much decomposed however, and containing two small seams of coal from eight inches to a foot in thickness. A great amount of debris covers the shales and renders it unsafe to make exploratory diggings.

Kuttha. At the top of the Kurrumea Wou above Kuttha and beneath a high precipice of limestone, dark arenaceous shales full of pyrites occur, and enclose two or three seams of coal of good quality, the thickest of which was not more than half a foot. It has a much more mineralized and compact appearance, than the lignite from most other localities. When we first observed the coal in this locality, in March 1851, the seam could be traced for about thirty yards, dipping to the north north-west at an angle of 25° under the nummulite limestone. In January 1852, when we again visited the spot, the out-crop of the coal was completely concealed by enormous masses of the limestone, which had a few days previously become detached from the cliffs above, during an earthquake. We merely mention this as illustrative of the difficulties that would attend any attempts to mine the coal, as it occurs generally in the Range.

Kathee in the Chichalee Pass. Between Kuttha and the Indus we have seen no coal deserving of notice, though films of it may be observed in the alum shales of the Bukkh ravine and in other localities. In the highly bituminous alum shales which supply the Kathee alum works, layers of very compact bituminous coal occur, but they seem to be continuous for but a short distance, either thinning out in the shales or becoming interlaminated with these. From the interior of one of the shale pits we obtained several specimens of coal which appeared to form a sort of nest inclosed in the shales, and was being quarried along with them for transmission to the

alum kilns. The miners declared to us that the coal never occurred in seams, but merely in patches of irregular extent and thickness. The shale at Kathee is remarkably fresh, and, except on the surface, is not at all decomposed. It contains more carbonaceous matter than any other shale of the sort we have seen in the nummulite limestone formation, and hence, as but little wood is required to burn it when once it is lighted, it is most economically used in the preparation of alum. The pits are sunk to no great depth in the shales which dip under the limestone at an angle of from 30 to 35°. By sinking a shaft to some depth in the shale it could be easily determined whether the coal occurs here as a seam or not. The locality is a convenient one and access to the present shale pits, easy.

Having thus indicated the existence of coal in seams of irregular thickness throughout the nummulite limestone formation for a distance of one hundred and thirty miles, it is evident that a very considerable amount of fuel exists; but the very irregular thickness of the deposit, the high angle at which the strata dip, their inaccessible position and the immense amount of debris in the cliffs above the coal will we believe prove serious obstacles to mining it successfully as a steamer fuel. A few experiments conducted in the more favourable localities can alone decide the point.

Wherever the coal has been observed, its characters are identical. It is evidently a lignite or brown coal as it gives a brown streak, and frequently contains half-decomposed patches of brown carbonaceous matter resembling peat. Specimens of the coal obtained from some depth, and which have not suffered from atmospheric influence, are highly bituminous, of a glistening black colour like jet or cannel coal and sometimes present a pavonine lustre. It is very brittle, a character peculiar to all lignites or recent coals, small crystals of gypsum may generally be observed in the coal; which, in most localities, contains but little of the iron pyrites so abundant in the alum shales. The origin of the coal is probably marine and from the abundance of large gasteropodous molluscæ in the strata both above and below the shales, it is probable that by their decomposition as well as that of fuci and other marine vegetables the coal has been formed. No indications of fossil wood or remains of land-plants have been detected in the shales, from which, however, we have procured one or two shells

of the genus Cerithium or some allied genus. The surface of the shales is sometimes encrusted with an efflorescence of sulphate of magnesia.

The coal is somewhat difficult to ignite, and at first emits a large quantity of smoke which has a strong empyreumatic odour. When combustion, however, is once established, it burns without coking, gives out a considerable amount of flame and heat, and leaves a brown ash, the quantity of which varies considerably in different specimens.

We annex the results of the analysis of two specimens of Baghanwalla coal, and of the coal from the Kathee alum-shale pits.

Baghanwalla No. 1.

Coke (carbon),	41.36
Volatile, bituminous inflammable matter,	40.64
Ashes,	18.00
Total,	100.00

Baghanwalla, No. 2.

Coke (carbon),	59.705
Volatile, bituminous inflammable matter,	38.455
Ashes,	1.840
Total,	100.000

N. B. No. 1 was from the upper part of the seam. No. 2 was from its centre, and was a remarkably fine fresh specimen.

Coal—Kathee alum-shale pits.

Carbon (coke),	33.579
Volatile, bituminous inflammable matter,	36.421
Ashes,	30.000
Total,	100,000

From the above it will be seen that though inferior to good English coal, that of Baghanwalla possesses the necessary requisites for a good steamer fuel. The small amount of ash in No. 2 is very remarkable.

From its large amount of ash the Kathee coal is of inferior quality and in burning would yield a quantity of clinker. If it could be got in quantities it would, however, be valuable, as it burns freely notwithstanding the large quantity of earthy matter it contains. Seams of coal apparently of a very similar character to those in the Salt Range are described by Sir Roderick Murchison as associated with nummulite limestone formation in the Alps and Appenines, in a paper published in the quarterly Journal of the Geological Society for 1848. He states that, "in the Brattenberg near Thun, a band of coal is associated with the nummulitic deposit which is now extensively used in the manufacture of gas at Berne. Near Val D'Agno to the south of Pecoaro, seams of coal are worked for use in that neighbourhood which lie in shales which dip away from the older rock, and pass under the adjacent hills of nummulitic limestone. In fact these coal beds occupy the same place as those of Entrevennes in Savoy, of the Diableritz, and of the Brattenberg in the Canton of Berne." We much regret that no particulars are stated in the invaluable paper from which we have quoted, as to the thickness, mode of working, &c. of the coal seams.

Petroleum exudes from the nummulite limestone rock in the Kuttawan near the village of Jubba, on the north side of the Salt Range, ten miles east of the Indus. It occurs but in small quantity, and is collected by a method similar to that employed at the petroleum springs of Kaffir Kote. It is associated with springs of sulphureous water, the sulphur of which as well as the petroleum are probably derived from the destructive distillation of the bituminous shales beneath the nummulitic limestone. It here receives the name of Gunduk ka tél (sulphur oil). It is of a dark brown colour, very fluid, and yields on distillation a good deal of Naphtha.

Besides the numerous springs charged with sulphuretted hydrogen, and which deposit sulphur on the rocks over which they flow, and on the grass and weeds by their sides, sulphur, in a mineral form, occurs near the surface of the nummulite limestone at Jubba, a little above the petroleum springs, in a white porous gypsum, which has evidently been formed by the decomposition of the limestone, unaltered portions of it still remaining imbedded in the gypsum.

The metamorphosis has doubtless been effected by the action of sulphuretted hydrogen and sulphureous acid. These gases, generated in the decomposing alum shales by passing through the fissured limestone and porous gypsum which covers its surface, become mutually decomposed, sulphur being deposited. Dumas in 1846 proved that when sulphuretted hydrogen at a temperature above 100° Faht. and still better when near 190°, comes into contact with certain porous bodies, a catalytic action is set up, by which water, sulphuric acid and sulphur are produced. In this way sulphur is universally formed in nature, and even in volcanic countries, "no well authenticated case of its sublimation in an uncombined state,"* is known. The thickness of the sulphur formation is very trifling, but may be observed over a space of about two miles along the strike of the limestone.

The sulphur is in small quantity and of a bright yellow colour. It was formerly worked by Maha Raja Goolab Singh of Cashmere, who found it unprofitable and removed his establishment to Nákbund (a most appropriate name for a sulphur manufactory), near Kooshalgurh on the right bank of the Indus between Attock and Kalibagh, where it is said, sulphur exists in considerable quantity. The unsettled state of the hill tribes in the Kohat district prevented our visiting the Nákbund sulphur deposit. We are however informed by Misser Gyan Chund, the present Tehsildar of Pind Dádun Khan and former tax-man of the Salt Range salt mines, that during the Seikh rule, he, for three successive years, from the above locality extracted 1000 Lahoree maunds of sulphur, for the manufacture of gunpowder for the Seikh army. This he was able to supply at the rate of Rs. 6 per maund. He described pits of thirty or forty feet in depth as being dug into the sulphur formation which he reckoned of considerable extent. The mines are about five miles from the Indus near a village called Ricí and about three miles below Kooshalgurh.

The mode adopted by the natives for extracting the sulphur from its matrix is very simple. A hole is dug in the ground on which a large gurrah or earthen vessel with a wide mouth is placed. This is then filled with the coarsely powdered rock. A second gurrah in

* Daubeny on Volcanoes, 2nd edition, p. 615.

the bottom of which a large hole has been made, is then put on the top of the lower one, and secured to it by a coating of clay, to which succeeds a third and a fourth, all communicating with each other. A sharp wood fire is then lighted under the lower gurrah, by which the sulphur is gradually sublimed in the form of flowers of sulphur into the upper ones, to the sides of which it adheres. The subliming process generally goes on for eight or ten hours, by which time all the sulphur has been expelled from its matrix.

None of the organic remains which occur in the nummulite limestone formation have been detected in the rocks inferior to it. The mulluscæ which characterize it have a totally different character, and neither belemnites, ammonites, nor terebratulæ which occur in the oolitic rocks beneath are to be seen, their place being taken by swarms of Foraminifera of the genera Nummulina and Fascialites? and by large Gasteropoda of the genera Conus, Trochus, Oliva, Mitra, Voluta, Terebellum, Natica, Acritina, &c.

Several large bivalves also occur, and a small Ostrea (?) forms in some places patches of yellow marly limestone.

The abundance of nummulites is very remarkable; and at least two or three species occur. They have of late years been considered as characteristic of formations superior to the chalk, and as regards the Alps where the nummulite limestone is so extensively developed, Sir Roderick Murchison, in his paper above quoted, says, "I am persuaded that no form of the genus Nummulina occurs below the surface of the chalk, or its equivalent," and again, "that the lowest beds with nummulites are completely above all those rocks which are the equivalent of the white chalk of northern Europe."

Cephalopoda seem very scarce. We have only obtained specimens of two large species of nautilus.

Radiata are in some places rather plentiful, and specimens of species of the genera Spatangus, Galerites and Clypeaster have been procured; some of the former are of large size.

The only indication of vertebrata we have obtained, are a few teeth, evidently those of sharks, and one or two small fragments of bone too indistinct, however, we fear, to be identified.

The fossils, except in the calcareous sandstone, are generally ill-pre-

served. In the limestone they are generally mere casts of shells, and those obtained were generally much weathered.

In superficial extent, the nummulite limestone formation covers a larger space in the Salt Range, than any of the rocks hitherto described. In the eastern part of the Range it is first observed on the northern flank of mount Tillah, a little above the village of Bhet, as a band of yellow marly shell limestone, not more than twenty feet in thickness, resting on upper Devonian red shales, and covered by thick beds of Miocene (?) strata. Preserving the same relations, it may again be seen at Jalalpoor on the North side of the Range, and from thence may be traced uninterruptedly to Baghanwalla, where it has a thickness of from seventy-five to eighty feet.

West of this it seems rapidly to increase in thickness and from the top of the Range when it crops out in the escarpment, it stretches north in nearly horizontal strata forming the table-land of Besharut. Here it skirts the flank of mountains Kuringuli and Drengun, the ridges of which, formed of Devonian rocks, have been forced up through the nummulite limestone, and throw it off with an anticlinal dip from either side. On the west end of mount Drengun, it entirely conceals the Devonian rocks, and from thence dips north under the narrow valley which separates mount Drengun from Deljubba. In this valley it is covered up by Miocene strata, but on the north side of the Deljubba ridge, again crops out dipping to the south-east under the Miocene strata at a high angle. At the west end of the escarpment on the north side of Deljubba it appears resting on the Devonian rocks, but on proceeding eastward it seems to thin out and to be covered over by the Miocene strata. The limestone can however be traced projecting here and there through the latter on to the Gharigulla Pass where it appears in a nearly vertical wall, some thirty feet thick, crossing the pass from south-west to north-east, and gradually disappearing under the Miocene strata, which are thrown off from it, from either side of an anticlinal axis.

We are not aware that the limestone is anywhere seen, between the Gharigulla Pass and Bulerala.

From the neighbourhood of mountains Kuringali and Drengun, the nummulite limestone stretches westward, and forms the superficial

rock in great part of the central district of the Salt Range. As far west as Noorpoor, it is in relation with Devonian rocks; but between this and Koofree, the carboniferous rocks intervene. In this neighbourhood the Oolitic rocks appear at the base of the Eocene formation, and as we proceed westward, separate it more and more widely from its eastern associates.

At the west end of the Sam Sikesur valley all the strata forming the high ridge of mount Sikesur are tilted up at a high angle. Along the foot of its scarped or S. S. E. side all the rocks are very much disturbed; but in the escarpment itself great regularity prevails, the nummulite limestone forming its summit and N. N. W. side till near its base, where it is covered up by conformable Miocene sandstones, &c.

From mount Sikesur on to within two miles of the Indus the nummulite limestone occurs uninterruptedly; but though of greater real thickness than to the eastward, makes comparatively little show, owing to the high angle (45 to 50°) at which it dips to the north-east under the Miocene rocks.

In the disturbance which the strata in the neighbourhood of Maree have undergone, the nummulite limestone seems to have been entirely removed, but on crossing the Indus to the Kalibagh hill, beds of it again appear.

These stretch round into the Chichalee Range, and, as seen in the Chichalee Pass, have a thickness of upwards of one thousand and three hundred feet. In this Range, as in the Salt Range, the nummulite limestone appears in bold white cliffs forming the summit of its scarped or south-east side, and the formation may be traced down to within six miles of the Koorum river, where it thins out under Miocene sandstone.

It does not appear in the upper part of the Kaffir Kote Range, though from the researches of Captain Vicary, it is known to occur to a considerable extent in the southern part of the Sooliman and Hala ranges. Capt. Grant too, in Cutch, has described a series of beds of nummulite formation extending over a space of about thirty miles, many of the fossils obtained from which are identified with those we have found in the Salt Range.

During the hot weather of 1851 we detected nummulite limestone

of a very different appearance from that of the Salt Range, as forming the surface rock at least of several of the Hazara hills north of Rawul Pindee and on the mount Mochpoor. About fifteen miles north of the new Murree Sanatarium, which attains an elevation of upwards of nine thousand and seven hundred feet, we obtained abundance of nummulite limestone on its sides and summit.

From Cashmere too, Mr. Vigne obtained limestone containing nummulites. This we have seen in situ on the side of a mountain at the upper end of the Manasabul lake, where it is much disturbed and calcined by greenstone. It probably forms the summit of many of the higher hills on the northern side of the Cashmere valley, a district fraught with interest to the Geologist, and hitherto quite unexplored.

When we consider that the nummulite formation may be traced from the Mediterranean through Egypt, Asia Minor and Persia into the north-west and southern provinces of British India, and throughout all this extent preserves the same zoological character, though differing considerably in mineral aspect, the importance attaching "to a right understanding of its true position in the Geological series," cannot be overrated.*

* Since writing the above, we have had the pleasure of perusing the anniversary address, for 1852, of the President* of the Royal Geographical Society, in which it is stated, on the authority of Professor Oldham, that "the coal and iron of the district of Cheera Punjee, or the range of hills which separates Assam and the Beramputer from the plains of Sylhet, belong to the nummulite tertiary formation." We may also state that from specimens of the coal and rocks connected with it, which were forwarded for our inspection from the Singrowlee coal mines near Mirzapore, in December, 1849, by Claude Hamilton, Esq. one of the proprietors, we gave our opinion that it was a coal of a similar character and of a similar age, with that of the nummulitic formation of the Salt Range. This coal is now pretty extensively consumed by the Ganges Steamers, and is sold at Mirzapore at the rate of 75 Rs. per hundred maunds. A sample of this coal, which we analyzed in September 1850, gave the following results.

Carbon (coke),	43.34
Volatile, bituminous inflammable matter,	50.00
Ashes,	6.66
Total,	100.00

* Sir Roderick Impey Murchison.

Tertiary, Miocene (?) Rocks, greenish Sandstones, argillaceous Grits, Conglomerates, and red and green Clays.

Resting on the nummulite limestone there is observed throughout the Salt Range a conglomerate of small rounded boulders of a similar limestone connected by calcareous sandstone. This passes into a series of soft greenish sandstones, alternating with bands of conglomerate, in which small boulders of plutonic and metamorphic rocks predominate. These bands are very numerous near the Indus above Kalibagh where among the boulders a black porphyry (melaphyre) is very abundant. Along with the sandstones and conglomerates, beds of argillaceous grit and red and green clays occur, which contain crystals of selenite and small veins of carbonate of lime and quartz.

The sandstones are highly calcareous, effervesce strongly when treated with muriatic acid, which, after dissolving the calcareous matter, leaves a sand chiefly composed of quartz, felspar, hornblende, mica and magnetic iron. In the neighbourhood of the nummulite limestone, their surface is frequently encrusted with a slight saline efflorescence, but this disappears in the upper beds.

Where exposed to atmospheric influence and to the action of water charged with carbonic acid, the sandstones are extremely soft and incoherent, but at some depth from the surface, many of the strata are hard and compact, and of a dark grey colour.

The thickness of the above strata is enormous, and cannot, we should think, be less than ten thousand feet, having, wherever seen, a remarkable uniformity of character. Fragmentary portions of the bones of large mammalia, &c. are everywhere to be found associated with silicified wood of a brown colour. These are most abundant in the argillaceous grits which are often so hard as to form excellent millstones.

The harder beds of grey sandstone yield a remarkably handsome building stone, though by no means likely to be a durable one in many localities, on account of the facility with which water charged with carbonic acid removes its calcareous cement and reduces it to the strata of a slightly indurated sand. It has, we believe, been used extensively in the construction of the various works along the new Peshawur road west of the Bukrala Pass, where fresh beds have

been exposed in the deep cuttings which have been made through the sandstones and clays which form entirely the Buhrala Range.

Gold is found in this formation in the form of minute scales diffused through the sandstones, and has doubtless been derived from plutonic and metamorphic rocks, the disintegration of which, has furnished the material of which the strata of the series are composed.

In the beds of the numerous nullahs or water-courses which flow through the Miocene district, the sand is washed pretty extensively for gold by the natives. It seems to be obtained in greatest quantity towards the Indus north of the Salt Range.

As compared with the gold fields of Australia and California the auriferous beds of the Punjaub are, as far as is yet known in a practical point of view, insignificant; but are nevertheless interesting as illustrative of the extensive diffusion of gold in debris over the globe.

We have been quite unable to trace the source from whence the gold has been derived, and are not aware that, among the quartzites and quartzose mica slates, which are much developed in the Punchal Range near the Baramula Pass into Cashmere and stretch west into the northern Hazara mountains, the metal has ever been detected in situ. From similar rocks, there can be little doubt that the auriferous sands have been derived; but the Himálayas must, at the period of their formation, have had a very different aspect from what they now present, and may not have been elevated at all above the general level of the country.

The mode of obtaining the gold is, we fancy, nearly the same as that adopted in other countries.

A part of the bed of a nullah or water-course or dry channel of a river having been fixed upon as a likely spot, the superficial stratum of sand and mud is removed, and that beneath collected with a wooden shovel and carried to the spot where it is to be washed, generally close at hand. The washing is effected in a long wooden box resembling a small shallow flat-bottomed boat, wide at one end and narrow at the other, where there is an opening for the escape of the water. The wide end of the "cradle" or troon as it is called, is slightly elevated, so as to give its flat bottom a gentle inclination towards its forepart, and a coarse sieve of reeds is then placed across the wide end of the box. On this the sand is thrown, and water

dashed upon it, by which means the finer sand is washed into the cradle, the coarser gravel being retained on the sieve. By continuing the washing with a gentle stream of water, the lighter particles of the sand are carried down the inclined floor of the cradle and escape with the water, while the heavier and auriferous sand assumes the highest level next to the point where the water is applied. In a very short time nothing remains on the floor of the cradle but a thin stratum of black iron sand in which the scales of gold may occasionally be seen to spangle. By continuing the washing of the sand the lighter particles are removed and the auriferous portion concentrated within narrow limits. When the washing in the cradle has been carried as far as is considered safe, the sand is removed by the hand into a circular concave wooden platter called a Kuttree, about two feet in diameter, made generally of sissoo (Dalbergia sissoo) or other hard wood. In this, by a circular motion, it is agitated with water by which means an additional portion of the black sand is got rid of, and washed away from the inclined sides of the platter by a stream of water skilfully applied. The residue is then rubbed up with a little mercury which quickly by amalgamation separates the gold from the black sand. The mercury is then removed from the platter, enclosed in a fragment of cloth and placed on a bit of live charcoal, by which means the mercury is speedily vapourized, leaving the yellow gold entangled with the tinder of the cloth, from which by rubbing, it is easily removed. In this state it is taken to the goldsmiths, who by fusing it with borax remove any mechanical impurities. The Indus gold is said to have a whiter colour than that obtained to the eastward, which probably results from its containing a small portion of silver alloy.

By the process above described, a party of two or three individuals can in one day collect from six to eight annas worth of gold. The washings are generally most productive after rains, during which of course large quantities of fresh sand are washed from the surrounding rocks with the nullahs.

In the neighbourhood of the Salt Range the scales of gold are small and almost invisible, but we have heard from natives that in Hazara, grains of gold are sometimes found of a size such as to admit of their being picked out of the sand. If this be true, we may infer

that the auriferous source is somewhere to the north, and that by tracing the gold stream, so to speak, we might arrive at a point where the drifted materials become coarser, and where the gold, from its high specific gravity, has been deposited in larger quantity.

By a similar method of reasoning, Messrs. Clarke and Hargreaves, in 1851, were led to the discovery of the extensive gold fields in the alluvial deposits of the Bathurst district, in Australia, where the amount of gold obtained, seems likely to produce an entire revolution in the monetary system of the world.

From the similarity of the central hilly districts of the gold fields of Australia with the auriferous districts of the Ural mountains, Sir Roderick Murchison, so early as the year 1844, predicted the existence of gold fields "and in 1846 he addressed the President of the Geological Society of Cornwall on the subject, and recommended any Cornish tin-miners who were unemployed to emigrate to New South Wales and dig for gold in the debris and drift, on the flanks of, what he had previously termed, the Australian Cordilleras, in which he had recently heard that gold had been discovered in small quantities." Had the British Government then attended to the suggestions of science, much of the evil resulting from the recent announcement of the abundance of gold might have been prevented by the timely introduction of suitable regulations for its mining.

Gold, wherever it has been noticed in veins, is found in greatest quantity near their surface, "which accounts for the existence of the metal in such abundance" in the debris of auriferous rocks, "the same agencies which deposited the drifted materials having also carried away the gold from the superficial portions of the veins in which it was originally formed."

In the sandstones and grits, but especially in the latter, bones, teeth, &c. occur. The bones seem chiefly to be the remains of large mammalia and are of a grey or a light brown colour. They are generally fragmentary, and are much rubbed, as if they had been transported from a distance. Associated with them we have found portions of the teeth of a species of mastodon and of a mammoth or elephant, the tusks of which, of enormous size, are occasionally found imbedded in the sandstone. We have also procured the core

of the horn of a species of deer, and teeth probably of a camel or nearly allied animal, besides several large saurian teeth and one large and curved tooth, probably that of some large carnivorous animal; a portion of the carapax of a Chelonian was also found. The fossils nowhere occur in great abundance, but are everywhere found in the miocene strata between the Jhelum and the Indus.

The only examples of molluscæ which have been detected in connection with the above remains, consist of three specimens of probably a species of Unio or Anadonta. These were found in the soft sandstones on the southern side of mount Tillah near the village of Hoon by my assistant, Mr. Theobald.

The fossil wood formerly alluded to as occurring throughout the strata, is evidently of endogenous structure, and many of the masses appear to have belonged to trees of large size. At Kullar Kuhar, in soft sandstone strata north of the Salt lake, patches of jet occur in small quantity, which are probably carbonized portions of wood, but in these the woody structure is in a great degree obliterated.

From both the mineral and zoological character of the tertiary strata which we have just described, there can be little doubt that they are merely the western extension of the strata of the Sivalik Range, which in the annals of geology have been rendered famous by the researches of Cautley and Falconer. These strata flank the great Himálaya Range, and from the Sutledge, we believe, may be traced along the north-eastward or hilly districts of the Punjab to the neighbourhood of the Jhelum, where they form a succession of ranges, preserving a general parallelism, running in a S. S. E. direction towards the plains from the flank of the Punchal Range.

On the left bank of the Jhelum, opposite the town, they form the Khorian range, and lower down stretch across the river into the Surafar hills which flank the east side of the Chumbal range between Tillah and Jelalpoor. In the neighbourhood of this range the miocene strata dip to the east at an angle of 70°, the dip gradually decreasing as we proceed eastward towards the Jhelum. They extend along the bank of the river to Jelalpoor where, in nearly vertical strata on which the town is built, they appear at the foot of the southern escarpment of the Salt Range, having evidently been formed into this position by the upheaval of the older rocks. About half a mile

west of Jelalpoor the sandstones disappear and no miocene strata are again seen on the south side of the range east of the Indus.

Proceeding westward from Jhelum along the Peshawur road, the miocene strata appear about four miles from Rhotas, rising out of the plain at a high angle, with a dip to the east and form the Rhotas range, which from the right bank of the Jhelum stretches south-west to Mount Tillah. By the upheaval however of the older strata of that mountain, an extensive fault has been produced by which the tertiaries in the immediate neighbourhood of its southern escarpment have been made to dip north, and, as it were, under the Devonian strata. Between Rhotas and Tillah the miocene beds are elevated into an anticlinal ridge, on the north side of which the strata dip westward towards Bukrala, where they are elevated into another parallel range to that of Rhotas. Beyond this they extend uninterruptedly to Rawul Pindee, presenting a series of anticlinal and synclinal axis.

From the Tillah and Bakrala ranges the miocene strata extend along the north side of the Salt Range, elevated into scarped ridges with a dip at a considerable angle to the north, which gradually diminishes as we recede from the Range.

In its central part where the nummulite limestone strata are in many places in a nearly horizontal position, patches of miocene sandstones, &c. occur, but from the facility with which they decompose, are rapidly undergoing disintegration on the surface of the limestone. Along the north side of mount Sekesur and on to the Indus, the tertiaries are elevated along with the inferior rocks, and at Nummul above Moosakhail may be seen dipping conformably with them (as is the case everywhere else) at an angle of from 50° to 60°.

Above Maree on the Indus they form barren hills of considerable height, which extend along the river up to Mokhudd, a distance of about sixteen miles. On its right bank they attain a greater height, and the summit of the well known scarped precipice of Dinghote, about two miles above Maree at the foot of which the Indus flows, is, as ascertained by the Thermometer, 2,113 feet. Above the Indus at Maree, looking north from its summit; the horizontal ridges of miocene strata can be seen as far as the eye can reach, crossing the Indus from N. N. W. to S. S. E. with a dip to E. N. E. At Maree the angle of dip is 35°, but this diminishes as we ascend the Indus.

On the Kalibagh hill the miocene strata have suffered great disturbance, and rest in some places on the salt marl. At this point there is a great amount of nummulite limestone conglomerate at the base of the formation. Along the north side of the hill it appears in normal order, resting on the nummulite limestone, and preserving this relation, stretches round into the Chichalee Range. On its west side the miocene strata are arranged in regular ridges forming the Chounterah Hills and in the Chichalee Pass, dip with the nummulite limestone to the north at an angle of 35°. From this to the Kaffir Kote range they occur uninterruptedly and there rest conformably on the carboniferous rocks dipping to the north-west under the Puncalah Pass, on the west side of which they are elevated into a high ridge which runs parallel to that of Kaffir Kote.

Along the east side of the Chichalee Range the same miocene sandstones, &c. occur as on the west side, but much disturbed and evidently overturned in some places during the upheaval of the range, which has thrown them under strata of the older rocks also overturned along with them, on which in a normal order they invariably repose.

Captain Strachey in a paper recently laid before the Geological Society, has described a series of tertiary ossiferous sandstones, &c. which occur on the Thibet plain on the north side of the Himálayas at an elevation of from 14 to 16,000 feet, which most probably are of an identical character with those of the Sivalik and Salt Ranges. These he describes however as "presenting an almost perfectly horizontal surface," and resting unconformably on oolitic strata, (apparently similar to those of the Salt Range), from whence he draws the conclusion that the oolitic strata, &c. on which the ossiferous tertiaries rest, have been elevated previous to the formation of the latter, but from the abundance of remains of large mammalia in these, he considers that "there can be no doubt that these strata have been elevated to their present height from some lower level since the time of their deposition."

In the Salt Range, we think, we have obtained sufficient proof that until after the deposition of the miocene sandstones, &c. no suddeu or extensive elevatory action had been exerted, and that during their formation, the surrounding country must have been in a condition

suitable for the maintenance of numerous huge mammalia, the remains of which, now entombed in rock, must, judging from their appearance, have been transported to a distance from the spot where they died.

That plutonic, metamorphic and igneous rocks must have formed the district, by the disintegration of which the materials forming the miocene strata have been derived, every one must admit, and as the boulders found in the conglomerates are small and such as we see now carried down by streams from Indian mountains during ordinary floods, we think it probable that the district in which the miocene beds occur, must have presented a range of mountains skirted at their base by a grove of forest capable of affording food to large pachydermata, and washed by an extensive fresh-water lake, in which the saurians, &c. whose teeth occur in the sandstone, could live and flourish. Into this, floods from the surrounding mountains transport boulders of rock, gravel and sand as well as the remains of land animals and trunks of trees. A succession of floods over an extended period would, we conceive, supply material for the formation of strata similar to the miocene beds we are considering.

It is not at all improbable that the sea may have had occasional access to our supposed lake, indeed the saline incrustation on the sandstones, &c. where they approach the nummulite limestone (an undoubted marine formation) strengthens this idea.

The absence, however, of marine shells, or other remains which exist so abundantly in the inferior strata, completely, we conceive, refutes the supposition that the miocene strata have been deposited in "a true sea bottom," an opinion, which as regards the Thibet tertiaries in which no marine organic remains have been found, Strachey seems disposed to adopt, while at the same time he admits "that there is no direct proof that these beds are marine."

When we consider the fragile character, and we believe comparative scarcity, in northern India, of land or fresh water shells, it is not surprising that they should so seldom occur in the miocene strata. The Physæ, Pupæ, and Helices, which abound over the Salt Range hills, are very rarely to be found in the alluvial deposits at their base, and the fact that rain water charged with carbonic acid, which it always acquires by passing through vegetation, is a most powerful solvent of carbonate of lime may explain in a great mea-

sure the scarcity of land shells. The rarity of the common land-shells of the Punjab in the high alluvial banks seen on the sides of the rivers, has often struck us as very remarkable.

Should the beds described by Strachey be proved hereafter to be identical with those on the southern flank of the Himálaya or Sivalik strata, it will go far to prove that this stupendous range has been upheaved from near the level of the sea to its present altitude at a comparatively recent period.

From a cursory examination of the ranges of hills between Rawul Pindee and the Baramula Pass, we are inclined to believe that from the former place to Ooree on the Cashmere river, nothing but miocene strata occur, forming ranges of from 4 to 8000 feet in height. At Ooree the metamorphic schist of the Punchal Range seems to have been forced through the sandstone strata, both being at this point tilted up into a nearly vertical position with a strike from east to west. Hard specimens of sandstone from this locality are undistinguishable from the hard grey miocene sandstone of the Salt Range. Between the Jhelum and Cashmere river in a line from Ooree to Rawul Pindee, we have never observed any organic remains, but towards Bhimbur to the eastward of Ooree, we believe, they are occasionally found, and are called by the natives "deo ka dant" or Demon's teeth, a name by which they are generally known in the Salt Range.

In reckoning as miocene, the sandstone grits and conglomerates we have endeavoured to describe, we only follow the generally-received opinion as to the age of the Sivalik strata. Further investigation may prove that these, as well as the corresponding strata west of the Sutledge, are of even more recent formation.

The occurrence of gold in the formation, furnishes an argument in favour of its being of post tertiary age, this metal and platinum being considered "the last formed of the metals" by the learned author of the article entitled Siberia and California in No. 174 (September 1850) of the Quarterly Review.

Post pliocene strata.

ALLUVIUM.

Resting on the miocene strata in an unconformable manner, may be noticed in many places along the north side especially of the

Salt Range, terraces composed of a succession of nearly horizontal layers of small boulders, gravel, sand and mud, the debris chiefly of Salt Range rocks. The boulders and gravel in these are very generally cemented by calcareous matter into the consistence of rock, and bands of kunkur, an impure concretionary limestone, are in some places abundant. This has doubtless been deposited by calcareous springs or by rain water which by passing through vegetation, has acquired carbonic acid and, through its solvent agency, carbonate of lime. In a similar way extensive deposits of travertine and calcareous tufa have been formed over the surface of the nummulite limestone and miocene strata.

In the neighbourhood of the Salt Range the alluvial beds have a slight dip towards the north, but gradually acquire horizontality, and increase in thickness and fineness of material, as we follow them into the plain or rather ravine country north of the range, where sections of them fifty to sixty feet in depth are exposed in the numerous nullahs and water courses which intersect the district, and in the beds of which they are seen reposing on the tilted up ends of the miocene strata.

Along the southern or scarped side of the range deposits of a similar character occur, but for a distance varying from one to two miles from its base, the materials are coarse and consist entirely of boulders of rock and gravel brought down by the numerous streams, which during rain acquire transporting powers which must be seen to be believed; we have on several occasions seen boulders three and four feet in diameter rolled along with the noise of thunder, by the force of streams suddenly swollen. As we recede from the range, the boulders gradually diminish, and are succeeded by deposits of gravel, sand and mud, the layers of which in the plain assume a nearly horizontal position.

Travertine or calcareous tufa is extensively burnt and yields a lime of excellent quality. It frequently, however, contains a quantity of mud, which is objectionable. At Jhelum the greater part of the lime used is obtained from travertine, and at Rawul Pindee, around which enormous deposits of it occur, we believe it is exclusively burnt. From its porous character it requires less fuel for its perfect calcination than the ordinary limestones of the district, a

matter of some importance when wood is scarce. Kunkur, used extensively for the metalling of roads is abundant every where in the alluvial deposit. Irregular beds of it occur in the neighbourhood of Jhelum.

The organic remains found in the alluvial formation appear to be entirely of a recent character, and to consist of the bones of bullocks, horses, camels, goats, &c. mixed with a few land shells of the genera Physa, Pupa, &c. The extreme scarcity of the bones is very remarkable, considering the number of bones and skeletons every where seen lying on the surface.

We are not aware that the remains of any large pachydermata have been found associated with the above bones.

As the alluvial strata north of the Salt Range are apparently formed from the debris of the tertiary strata, "gold dust" must occur in these, and, during rain, must be washed into the various streams and water courses. The immense number of boulders of Plutonic, Volcanic and Schistose rocks which occur in the alluvion or drift in the neighbourhood of Mokhudd on the Indus (though identical with those in the miocene conglomerates), may possibly in part be derived from other rocks to the northward which may contain gold. The black slate rocks of Attock if metamorphic or of Lower Siberian or Cambrian age (we have never visited the locality) and invaded by quartz veins, may probably yield gold. Boulders of slate rock, similar to hard specimens we possess from Attock, occur abundantly both in the auriferous miocene (?) as well as drift or alluvial strata between Kalibagh and Mokhudd. As illustrating the statistics of gold in the Punjaub, we may add on the authority of L. Bowring, Esq. C. S. that in the Jhelum district, which includes all the auriferous ground near the Salt Range, with the exception of a small corner near the Indus in which Mokhudd is situated, there were in the year 1850, 158 cradles or troons in use for gold washing, which paid to Government an annual tax of Rs. 525, from Rs. 2 to 5 being levied on each troon. We can obtain no information as to the yield of gold from each troon; but when at Mokhudd, in 1848, the Kardar of that place informed me that in

1844,.....409 tolas* of gold were collected.
1845,.....272...Do. ..... Do..... Do.
1846,.....332...Do. ..... Do..... Do.

It is of course the object of the gold-washers to conceal as much as possible the amount of gold obtained, so as to keep the tax as low as possible.

The Upheaval of the Salt Range, &c.

Before closing our account of the Salt Range, it remains for us to notice certain particulars in the conditions under which its formations were deposited, and certain phenomena they in some places present, resulting from the general upheaval of the range into its present elevated position.

We conceive that previous to the general elevation of the strata and during the period of their deposition, they must have undergone a succession of gradual risings and sinkings.

The Salt marl and the Devonian strata which succeed have been probably deposited in shallow water as indicated by the frequent occurrence of ripple markings on the sandstones.

The lower beds of the carboniferous limestone which follow, must from the abundance of large Brachiopoda they contain, have been deposited at a considerable depth, as such molluscæ are known to characterize a marine zone of upwards of eight hundred feet in depth. At this depth the influence of tides could not produce the ripple markings observed in the Devonian sandstones, and we must therefore infer that previous to the deposition of the carboniferous strata, the former must have undergone a gradual subsidence to an extent sufficient to admit of the deposition of the latter, the strata of which must have rapidly increased in thickness, so as to have had their surface raised to a depth at which the Cephalopoda which abound in the upper beds could exist.

By the deposition of the sandstones and shales of the middle carboniferous series, the strata seem to have been elevated to the surface of the sea and a beach at least must have existed, on which the marks of falling rain or hail were impressed. After this period, a

* This Tola weighs 165 grains. In 1844, there were therefore collected 140 Troy Oz. and 285 grains of gold.

second subsidence must have occurred to admit of the formation of the upper carboniferous beds which in some places contain brachiopoda in abundance. By the gradual accumulation of calcareous and sedimentary matter, these seem again to have been brought near the surface, and dry land must have existed at the commencement of the oolitic series on which delicate ferns could support existence.

Succeeding the beds which contain these, we have the oolitic grits and shales, with fragments of large coniferæ which incontrovertibly prove the existence of land from whence the wood, &c. had been drifted. As we ascend in the oolitic series the wood becomes scarcer and as terebratulæ occur in the upper limestones and belemnites and ammonites in the upper shales and green sandstone, it seems probable that soon after the commencement of the formation, a third subsidence occurred, by which the strata were sunk to a considerable depth under the sea, from which they did not emerge until towards the close of the nummulite limestone formation. By a gradual and local deposition of calcareous matter along a particular line, similar to the manner in which coral reefs are formed, a sea barrier may have been raised, inside which in an inland fresh-water sea, the miocene strata have probably been deposited.

The occurrence of small water-worn boulders of nummulite limestone cemented by calcareous sand into a conglomerate which forms the lower member of the miocene beds in the Salt Range, indicates the existence of a beach where they may have been formed by the lashing of the waves.

As all the strata seen in the Salt Range repose conformably on each other, it appears to us certain that from a position of comparative horizontality they have all been upheaved subsequent to the deposition of the miocene strata. The upheaving force seems to have extended from east to west, the direction of the Range corresponding to the strike of the strata. Whether this has been exerted by the agency of plutonic or igneous rocks, we have no means of judging, as no rocks of the kind appear in the Salt Range or its neighbourhood.

Between Rhotas and mount Tillah the elevating force has raised the miocene strata into an anticlinal ridge. Along the line of this mountain, however, to the westward it has been exerted with greater violence, having produced a fracture of the strata along the line of

strike elevating the northern portion into a high ridge, the strata forming which have a northerly dip, and present a steep escarpment to the south. Along the south side of this line of fault the miocene strata seem only to have suffered, and are either thrown under the older elevated strata of the escarpment, as along the south side of mount Tillah, or tilted up at a high angle with a southerly dip, as at Jelalpoor. Moving westward, the elevatory action seems to have extended laterally over a greater surface, and to have produced several lines of fault which, in the central part of the Salt Range, have in some places thrown the strata into great confusion, and caused the formation of numerous longitudinal valleys, ridges and transverse ravines. In section No. 8 two very distinct faults, seen in the range west of mount Sikesur, are represented.

At Moosakhail where the range running in a north-west direction is not more than three miles broad, and is intersected by a transverse gorge, an excellent section is exhibited of the strata from the carboniferous limestone to the miocene beds. Here the upheaving force has raised the carboniferous strata into an anticlinal ridge, and without fracturing them has produced a graceful curving which is well seen near the entrance to the ravine. Above the carboniferous strata, a fracture has extended through the oolitic and superincumbent rocks, dipping to the N. N. E., and a vast amount of their debris covers the carboniferous limestone as it dips to the S. S. W. under the plain. Between Moosakhail and the Indus, where the range again expands, and is eight or nine miles in breadth, considerable disturbance prevails among the strata.

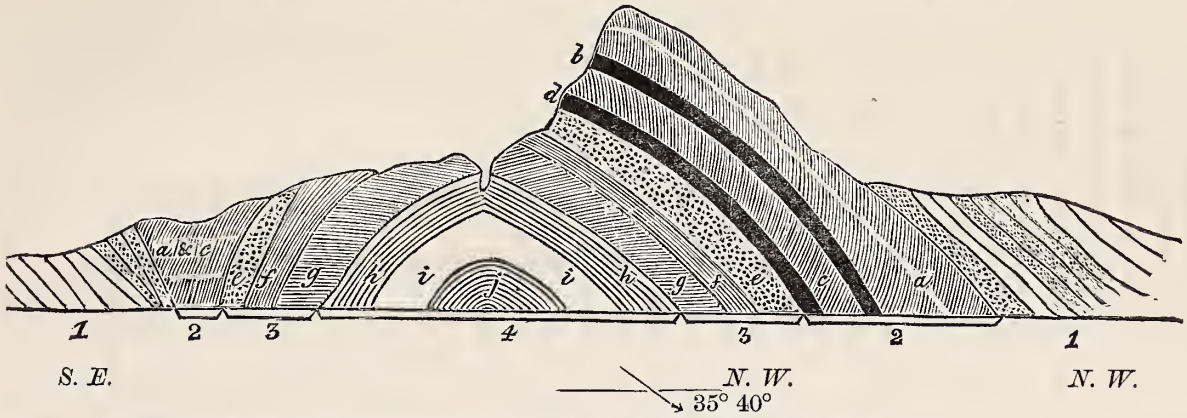
When describing the position of the Kalibagh coal we alluded to the overturning of the strata in the Kalibagh hill, and need not refer to it again.

In the Chichalee Range which runs from north-east to south-west the elevatory action seems to have extended laterally with violence over but a small extent, but has produced a most remarkable and distinct overturning of the strata along its south-east or scarped side. This is represented in section 9 as seen in the Chichalee pass, at the entrance to which, in an overturned position, the strata from the miocene sandstones, &c. to the oolitics, may be observed, and separated by a fault from the same beds on a steep escarpment, in regular order, dipping to the north at an angle of from 30° to 35°.

A more complete overturn of strata can nowhere be found. The lower portion has evidently been broken off the upper portion of the series, and by the eruptive force been made to describe an arc of 18°.

On moving south along the range and about five miles beyond the Chichalee pass, in a ravine called Peela Wan the strata present a distinct anticlinal axis along the foot of the escarpment.

Section across the Chichalee Range in the Peela Wan, five miles below Kothee.



1. Miocene sandstones, grits, conglomerates and clays.
2. Eocene strata.
   - *a*. Upper nummulite limestone with flints.
   - *b*. Upper alum shales.
   - *c*. Lower nummulite limestone.
   - *d*. Lower alum shales.
3. Oolitic strata.
   - *e*. Belemnite and ammonite sandstones and shales.
   - *f*. Cherty limestone.
   - *g*. Sandstones, grits, and shales with fossil wood.
4. Carboniferous strata.
   - *h*. Upper limestone with Encrinites, Productæ, &c.
   - *i*. Sandstone and shales.
   - *j*. Lower limestone with Encrinites, Productæ, Orthoceratites, &c.
3. Oolitic strata reversed.
2. Eocene limestone strata reversed and much compressed and shattered; no shales seen.
1. Miocene sandstones reversed.

Here a section is exposed of all the strata from the lower carboniferous to the miocene beds as in the rough sketch annexed, a fracture extending through all the upper strata and into the upper carboniferous formation, the middle and lower beds of which are only sharply curved by the elevatory action, which has, along the line of fracture, not only separated the southern from the northern portion of the oolitic and superior strata, but has produced a complete overturn of the miocene and eocene beds, bringing them under the oolitic and carboniferous formations. The eocene formation seems to have suffered much during the overturn as it is much reduced in thickness and is everywhere shivered and contorted. The alum shales too seem to have been squeezed out of the limestone as it were, as no trace of them is to be seen.

The same anticlinal arrangement of the strata may be traced along the Chichalee Range to Mittha near the Kurum river, where a scarped ridge of miocene strata forms the range. All along the southern side of the line of fault or fracture in the Salt Range, the strata have suffered denudation to such an extent as to have removed in most places all traces of rock in situ.

The effects of the overturning of the strata in the Chichalee Range are, to a Geologist, often most perplexing, and until we had seen the section as exposed in the Chichalee Pass and to the south, we had difficulty in explaining how shales full of ammonites, belemnites, &c. could possibly occur dipping apparently under carboniferous limestone full of palæozoic fossil, as may be seen above the village of Kalokhail near Kalibagh.

The upheaval of the Himálayas after the tertiary era and contemporaneously with the Salt Range will fully explain the anomalies described by Captain Strachey of tertiary, secondary and palæozoic strata dipping on the south or Indian side of the Himálayas, as it were under the metamorphic schists of the central ridge, while on the northern side they rest upon these in a regular order.

The researches of Dr. Thomson while engaged on the Thibet Mission, will, we trust, throw light on this interesting subject. A journal of his travels for two years in the northern Himálayas is now, we are happy to know, in course of publication in England.

(To be concluded.)

Remarks on the different species of Orang-utan.—By E. Blyth, *Esq.*

To Mr. W. W. Nicholls of Sarawak, the Society is indebted for the nearly perfect skeleton of an adult wild Orang-utan, of the peculiar species known to the inhabitants of Borneo, according to Sir James Brooke, by the name *Mias Pappan;* and which, together with other skulls and skeletons of adult Orangs in our museum, and the exquisite lithographs of others, again, published by Professor Owen, fully bears out the opinion of Sir J. Brooke expressed in a letter to the Zoological Society and published in the 'Proceedings' of that Society for 1841, p. 55, of the existence of three distinct species of Orang-utan in Borneo.

Professor Owen had previously distinguished his Pithecus morio (*Mias Kassar* of Brooke) from the great Orang then known to him, from specimens to which I had the pleasure of first calling his attention, and which are admirably figured in the 'Transactions of the Zoological Society,' Vol. II, pl. 30 to 34 inclusive; and from certain differences observable in skulls of great Orangs compared and figured by him, believed or known respectively to be from Borneo or Sumatra, the same zoologist has indicated what appeared to him to be at least local varieties, one proper to each of those islands, and he applies the names P. Abelii to that of Sumatra and P. Wurmbii to that of Borneo, of course under the impression that the great Sumatran Orang referred to was identical with that described by Dr. Clarke Abel from Sumatra in *As. Res.* XV, 489.

A huge skull of an adult male Orang, undoubtedly from Borneo, is figured in *Trans. Zool. Soc.* II, pl. 31 and 32; and that of an adult female (?), said to be from Sumatra, in the same work, Vol. I, pl. 53 and 54. The differences between these skulls are considerable: and they are, to some extent, borne out in a huge male skull marked from Sumatra and in an aged female skull marked from Borneo, in this Society's museum.* In both of the latter, however, the characters are throughout intermediate. The zygomatic suture

* Presented by Major Gregory in 1838 (vide *J. A. S.* VII, 669); the Sumatran male skull, however, having been for some years reserved.

of the Sumatran male begins even anteriorly to that of Prof. Owen's Bornean male: the *symphysis menti* in both is equally developed: the supra-orbital ridges, however, are much more prominent in the male from Sumatra, as in Prof. Owen's Sumatran female; but in our aged Bornean female skull, they are considerably more developed, proportionally, than in Mr. Owen's Bornean male. In both of Mr. Owen's specimens, the palate is represented as contracted posteriorly, between the last molars on each side, to $1\frac{1}{2}$ in. (or rather more in the Sumatran female). In our Sumatran male the distance is fully $1\frac{3}{4}$ in.; and in the Bornean female $1\frac{5}{8}$ in. I can come to no other conclusion than that all represent individual varieties of one species, having perhaps a tendency to exhibit the local variation which Prof. Owen has indicated.

The same naturalist adds—"The Bornean Pongo, if we may judge from the few specimens undoubtedly from that locality which exist in the museums of this country, is clothed with loose long hair of a deep fuscous colour, approaching in some parts to black; the Sumatran Pongo is covered with loose long hair of a reddish-brown colour. The adult male of the Bornean species has the countenance disfigured by large dermal callosities upon the cheek-bones. These do not exist in either sex of the Sumatran species." It is worthy of note that the term *species* is here bestowed, probably from the remarkable difference implied by the last mentioned character. The fully adult Sumatran male described by Dr. Clarke Abel, however, and the skin of which is still in this Society's museum, possesses the cheek callosities, less developed however than in the Bornean male figured by Prof. Temminck.

Sir J. Brooke, in his highly interesting letter already referred to, besides pointing out the distinctions of two of his three species of Bornean Orangs from personal observation of the living or freshly killed animals wild and tame, remarks that the skulls also examined by him may be divided into three distinct sorts.

"The first presents two ridges, one rising from each frontal bone, which joining on the top of the head, form an elevated crest, which runs backward to the cerebral portion of the skull." To this may accordingly be referred the P. Wurmbii and the P. Abelii of Owen, and, it would seem, all the adult skeletons at present in Europe

without described exception.* It would appear that neither sex has the cheek callosities at any age; and the colour of the hair is said to be darker than in the others. This description corresponds with the appearance of an enormous female Orang-utan that was exhibited some years ago in Calcutta (vide *J. A. S.* XVI, note to p. 729); and the animal is the *Mias Rambi* of Sir J. Brooke.

The same observer continues—"The second variety [of skull] is the SIMIA MORIO, and nothing need be added to Mr. Owen's account, save that it presents no ridge whatever beyond the frontal part of the head. No. 9 in the collection is that of an adult male. * * * There are many other skulls of the SIMIA MORIO which nearly coincide with this suite, and this suite so entirely coincides through the different stages of age, one with another, that no doubt can exist of the SIMIA MORIO being a distinct species. The different character of the skull, its small size and small teeth, put the matter beyond doubt, and completely establish Mr. Owen's acute and triumphant argument, drawn from a single specimen."—Of PITHECUS MORIO, our museum contains a skeleton (minus most of the bones of the hands and feet) of an aged female, presented by R. W. G. Frith, Esq., in 1836.† It had died in Calcutta, and the skin containing the bones of the hands and feet had been unfortunately thrown away when Mr. Frith secured the body for the Society's Museum. A few of the digital bones, however, were recovered. Comparing the skull of this specimen with that figured by Prof. Owen (*Trans. Zool. Soc.* II, pl. 33 and 34), I incline to infer that Mr. Owen's specimen is the skull of a male animal, chiefly from the greater depth of the alveoli: the longitudinal extent of grinding surface of the series of upper molars (bicuspids included) is exactly 2 in., as also in another skull of an adult female to be presently noticed, and 2 in. 2 l. in that figured by Prof. Owen: lastly, the zygomatic arch of our aged female skull is much more slender than that of either of the others.

* Unless, perhaps, that of an adolescent female in the museum of the Royal College of Surgeons, London.

† Vide *J. A. S.* V, 833, where mentioned as "the Sumatran Orang-utan." She was one, however, of a pair purchased by our joint-Secretary Mr. Grote, at Singapore; and this gentleman informs me—"They were not from Sumatra, but from Borneo. At least I am pretty sure that my memory does not deceive me on this point."

We have also another and complete skeleton of an adolescent female, which lived twelve years in Calcutta in the possession of J. Apcar, Esq., and was very young when he received it. The last molars above and below had just pierced the gums. The skin of this individual is mounted in our museum, possessing hair of a very dark colour on the crown, back and arms. Having passed its life in close captivity, with nought to call forth the vigorous action of its muscles, their development with that of the osseous system generally would seem to have been considerably affected, and the skull retains a remarkably juvenile (which in this case means *anthropoid*) expression, contrasting greatly with that of our other and aged female skull already noticed. But making every allowance for difference of age and a life of close imprisonment, and the other specimen had in all probability been captured when fully adult, there remain some extraordinary discrepancies, which probably indicate a further specifical distinctness. All the bones of the aged animal are more robust than those of the other; but while the leg-bones and the *humeri* of the two are of the same length, or at all events the *humerus* of the aged animal does not exceed by $\frac{1}{4}$ in. that of the adolescent, the *radius* of the aged specimen is 2 in. longer than that of the other.

The differences in the form of the skull are very considerable. The younger individual has the face conspicuously shorter and broader, with circular orbital cavities, while those of the aged animal are perpendicularly oblong. The vertical span of the orbital cavity is $1\frac{1}{2}$ in. in the aged specimen, $1\frac{3}{8}$ in. in the other; horizontal span of the same $1\frac{1}{4}$ in. in the former, $1\frac{3}{8}$ in. in the latter. In the younger individual the orbital process of the frontal and that of the malar bones form together a projecting angle where united by the suture; in the other they do not angulate at all. Extreme breadth of bony orbits in the adolescent specimen 4 in.; in the other $3\frac{3}{4}$ in. The zygoma of the aged individual, as before remarked, is much more slender than in the skull figured by Prof. Owen; in the younger, the malar portion of the zygoma is even broader than in Mr. Owen's specimen. The nasal orifice of the aged skull is much larger than that of the other. The development of the alveolar portion of the jaws is also much greater in the aged animal; whence the chin

slopes but little, whilst in the other it slopes excessively. In the aged specimen the ramus or ascending portion of the lower jaw turns abruptly at a right angle with the alveolar portion, and the coronoid process is little developed, and does not rise to a level with the zygomatic arch; in the young specimen, the form is more as in Mr. Owen's figure, though less angulated. In this adolescent skull the intermaxillary bones continue strongly demarcated.

It remains for future observation of additional specimens to determine whether the differences here indicated denote a diversity of species, or whether they may be referred to extraordinary individual variation.*

"The third distinction of the skulls," continues Sir J. Brooke, "is, that the ridges rising from the frontal bones do not meet, but converge towards the top of the head, and again diverge towards the posterior portion of the skull. These ridges are less elevated than in the first mentioned skulls, but the size of the adult skulls is equal, and both present specimens of aged animals." A wild adult male killed by himself, with huge cheek callosities, proved to possess this form of skull: but Sir J. Brooke erroneously assigns the animal to Pithecus Wurmbii apud Owen, in which, as we have seen, the lamdoidal crests unite upon the crown, as they also do in his P. Abelii (here regarded as a mere variety of the same species); whereas the Bornean animal of Van Wurmb and the Sumatran animal of Dr. Clarke Abel were of the present race distinguished by the ugly cheek callosities, and to which no special name has been assigned, as the appellations *intended for them* have been at-

* I had recently the opportunity of observing a nearly grown living male of what I considered to be Pithecus morio. It had no cheek callosities, and had not developed its hindermost *molares*. This animal was taken in the 'Hindustan' steamer for Suez; and is, I think, a larger Orang than has hitherto been seen alive in Europe. Before reaching Madras, it escaped from its cage and found its way into the saloon, where it would appear to have been re-captured with some difficulty and to have severely bitten two of its captors. In its cage it seemed quiet and good-tempered, and I handled it freely; but could not get to see it to much advantage. It appeared to resemble much the adolescent female above described, but was smaller, with larger face, and the expression was as distinctly masculine in the one as feminine in the other.

tached respectively to Bornean and Sumatran examples of the *Mias Rambi*.

The Bornean species with double-crested skull and huge cheek callosities is the *Mias Pappan* of Sir J. Brooke, or rather of the native Dyaks: and Sir J. Brooke remarks of it (not at that time having seen a female), that—"Both Malays and Dyaks are positive that the female of the *Mias Pappan* has cheek callosities, the same as the male:" and from his own observation he adds that the *Mias Kassar* has no cheek callosities in either sex; whereas some young *Pappans* he had shipped, "(one of them *not a year old*, with two first molars,) shew them prominently."* For a figure of the adult male of the *Mias Pappan* of Borneo, and series of plates illustrative of its anatomy, vide the great Dutch work of Dr. S. Müller and Professor Temminck; but unfortunately they give no representation of the bony crests upon the skull.

Of the long celebrated specimen of a large Orang-utan procured by Capt. Cornfoot in Sumatra, and described by Dr. Clarke Abel in the 'Asiatic Researches,' Vol. XV, p. 489, we still possess the skin minus the right hand and right foot, and of its osteology only the lower jaw and the bones contained in the dried left hand and left foot. It is by no means a specimen of the largest size, as long ago shewn by Dr. Harwood in *Lin. Trans.* XV, 472;† but the teeth and appearance of the jaw prove it to be fully grown, and the third inferior true molar is scarcely less abraded than the penultimate. This lower jaw is remarkable (especially as being that of a mature male animal) for the small antero-posterior diameter of its ramus or ascending portion as distinguished from the alveolar portion, and also for the small size of the condyle. Vide figures in *As. Res.* XV, pl. IV, and ($\frac{1}{2}$ size) in *J. A. S.* VI, pl. XVIII; and compare these

* Mr. Nicholls states, in a letter, that—"Both sexes of the *Mias Pappan* have immense cheek callosities: a full grown female was lately killed at Samaratan, the callosities of which extended as low down as the breasts [here the *tracheal sac* must be referred to!] The *Mias Rambi* is without any callosities, and is, I think, covered with longer fur than the *M. Pappan* has."

† Dr. Harwood gives the length of the feet of a Bornean Orang described by him as 15¼ in.: the dried foot of Dr. Abel's specimen (containing the bones) measures 13 in.

with the representations now given of the lower jaws of other Orangs, and especially with that of the great Sumatran skull of a female *Mias Rambi* figured by Prof. Owen in *Trans. Zool. Soc.* I, pl. 53. Its greatest antero-posterior diameter (on a plane with the molars) is $2\frac{1}{4}$ in. only, that of a female (?) *Pappan* from Borneo is $2\frac{3}{4}$ in., of a Bornean female *Rambi* $2\frac{5}{8}$ in., of a Sumatran male *Rambi* $2\frac{3}{4}$ in., and of Prof. Owen's Bornean male the same, and of his Sumatran female $2\frac{7}{8}$ in. Yet all the teeth are somewhat larger than in the Bornean female (?) *Pappan*, and equal those of our great Sumatran male *Rambi*. The hands and feet also are larger than those of our female (?) *Pappan* from Borneo. There are no materials for extending the comparison: but it may be remarked, of Dr. Clarke Abel's specimen, that (as before asserted) it has distinct cheek callosities, though seemingly less developed than in Dr. S. Müller's figure. The beard, however, is scarcely less grown:—but the general colour of the hair is much darker, and more of a maronne-red; inclining to ferruginous upon the crown, and the beard is bright ferruginous contrasting strongly with the rest.* I incline to consider it identical with the *Mias Pappan* of Borneo, notwithstanding the comparative feebleness of the ramus of the lower jaw in this particular specimen; and I suggest that the old name Pithecus satyrus be now restricted to this species, and justly or with peculiar justice, as Sir J. Brooke remarks in his letter, "from the ugly face and disgusting callosities."†

The nearly perfect skeleton now presented to the Society by Mr. Nicholls is that of a fully mature Bornean female (?) of the *Mias Pappan*, in which the strongly developed lamdoidal ridges of the skull do not unite upon the vertex to form a single sagittal crest,

* This specimen is remarkable for having a well developed unguinal phalanx and nail to the hallux; a character of rare occurrence in the genus, and exhibited by no other specimen in the Society's collection.

† As the *Rambi* is neither Wurmb's nor Abel's animal, the names Wurmbii and Abelii are unsuitable for it, and had better be disused; while as Raja Brooke was the first to discriminate it from the *Pappan*, I would suggest that it now bear the designation of Pithecus Brookei. Should the second small Orang also prove a good species, the name Owenii bestowed on it would be a fitting compliment to the eminent zoologist, who has devoted so much attention to the study of the great anthropoid Apes.

but continue an inch apart where most approximated. The size of the skull is fully equal, or even somewhat superior, to that of our aged female skull of a *Mias Rambi* from Borneo; but is inferior to that of our Sumatran male of the *Mias Rambi*. The skull is perfect, except that part of the face appears to have been shot away, viz. the uppermost portion of the right superior maxillary from the orbit to the nasal orifice, with parts of the adjacent malar, lachrymal, and nasal bones of the same side; and the supra-orbital ridge of the left frontal is diseased, with portions of bone exfoliating away. The vertebral column is complete, excepting the two last small coccygeal bones. The ribs and sternal series are also complete, and the great bones of the limbs; but many of the smaller bones of the latter are unfortunately missing. Thus, of the right hand, there are wanting the scaphoid, and the five unguinal phalanges. Of the left hand, there also are wanting the five unguinal phalanges, the medial thumb-phalanx, and the cuneiform bone of the wrist. Of the right foot are wanting the *os calcis*, *astragalus*, and navicular bone, four unguinal phalanges (the terminal phalanx of the hallux remaining), the penultimate phalanx of the finger-toe next to the hallux, and the penultimate and ante-penultimate phalanges of that furthest from the hallux, corresponding to the human little toe. And of the left foot there are only the *astragalus*, and the digital bones excepting the metatarsal of the digit next to the *hallux*, and the unguinal phalanges of the outer three toes.* The *patellæ* are also lost.

This valuable skeleton affords us the means of demonstrating, from adult specimens in our museum, the existence of the three species of Bornean Orang-utan indicated by Sir J. Brooke; and most probably we possess a fourth in the mounted skin and complete skeleton of the adolescent female resembling PITHECUS MORIO in size, but having a much shorter fore-arm and more anthropoid conformation of skull. We have also (provisionally) identified Dr. Clarke Abel's

* Accordingly, but one unguinal phalanx remains, which articulates with the digit next to the hallux of the left foot. The terminal phalanx of each hallux exhibits a peculiar structure, and represents the ordinary penultimate (and not the unguinal) phalanx; so that this Bornean *Pappan* differs herein from Abel's Sumatran *Pappan*, which possessed a well developed unguinal phalanx and nail to the opposable hallux or great toe.

Sumatran Orang-utan with the *Mias Pappan* of Borneo, to which the specific name SATYRUS is here proposed to be restricted; and we have referred Prof. Owen's P. WURMBII and P. ABELII to the *Mias Rambi* of Borneo, which also should therefore be common to the two islands. The small P. MORIO, so far as hitherto known, is peculiar to Borneo; and it now remains to ascertain whether there be not two small species confounded under this, two small as well as two large species of these animals. It is only recently that a great and a small species of Chimpanzee have likewise been discriminated and completely established by Prof. Owen and Dr. Kneeland.*

The three Bornean species of Orang of Sir J. Brooke (at least two of which would appear likewise to inhabit Sumatra) are more different from each other in the appearance of the adult skull than the Lion, Tiger, and Leopard are among cats; yet with the exception of the bony ridges, which in the MORIO are merely indicated (exhibiting the direction which they assume in the *Mias Pappan)*, I have been unable to detect any difference of structure between the skulls of the two great species which may denote other than slight individual variation. In general, the form and size of our *Mias Pappan* skull are intermediate to those of our (Sumatran) male and (Bornean) female *Mias Rambi* skulls; and the nasal orifice of the former is comparatively small. But how slight is the difference between the skulls even of the Lion and Tiger among cats,—confined to a straighter profile on the part of the Lion, and to the fact that the nasals extend back beyond the suture of the maxillaries in the Tiger skull, while they fall short of that suture in the Lion skull!†

* Vide *Trans. Zool. Soc.* III, 381, and *Ann. Mag. N. H.*, July, 1852, p. 23 *et seq.*

† An analogous diversity perhaps exists in the skulls of the *Mias Rambi* and *Mias Pappan*, which, if it prove constant, will be of service in enabling us to determine to which of these species immature skulls shewing large permanent molars should be referred. In our adult male and female *Mias Rambi* heads, and also in one juvenile skull taken from a stuffed specimen of a half grown male without a sign of cheek-callosities in our museum, the united nasal bones extend upward to the summit of the *glabella* between the supra-orbital ridges; whereas in our *Mias Pappan* skull, and also in both (species ?) of our *Mias Kassar*, the united nasal bones extend upward but little beyond the maxillary suture, and the same in

From the form of the pelvis, and from the inferior longitudinal extent of the molar series as compared with that of the lower jaw of Dr. Clarke Abel's Sumatran male *Pappan*, also from the inferior size of the hand and foot as compared with these members in Dr. Abel's specimen, I have considered the skeleton of a *Pappan* now presented by Mr. Nicholls to be that of a female animal; but not without considerable hesitation.* We have no male pelvis of an adult Orang for comparison; but two of undoubted females of the small species, and one of these (that of the animal which passed its life in close captivity) is singularly narrow, and probably differs little from a male pelvis. The skeletons of adult *Mias Rambi* and of adult of the small Chimpanzee figured by Prof. Owen in the first Volume of the 'Transactions of the Zoological Society' are also those of females; and Mr. Owen gives 5 in. 5 l. as the antero-posterior diameter and 4 in. as the transverse diameter of the pelvic aperture of his adult female *Mias Rambi*, the corresponding diameters of the pelvic aperture of our *Mias Pappan* being 5 in. and 4 in., in our aged female *Mias Kassar* $4\frac{1}{2}$ and $3\frac{1}{2}$ in., and in our adolescent female with the comparatively short fore-arms $4\frac{1}{2}$ and $2\frac{1}{2}$ in. (!); which last are probably the permanent male proportions, to which I

three immature skulls with large permanent molars in course of development, which should therefore represent the young of the *Mias Pappan*.

It remains however to ascertain how far this distinction may prove constant. We have, in all, five stuffed specimens of Orangs, viz.: 1, Dr. Clarke Abel's Sumatran male *Pappan*,—2, Mr. Apear's adolescent female *Kassar (?)* with short fore-arm,—3, a young female *Kassar (?)* with small permanent grinders appearing, and similar proportion of arm and fore-arm to last,—4, a very young *Mias*—— *?*,—and 5, the young male *Mias Rambi (?)* before referred to. Colour of No. 5 a darkish ferruginous, deepest on the crown, paler and more rufous on the shoulders and back and also the whiskers; hands and feet small, as in the *Mias Kassar*. Colour of No. 3, a lightish ferruginous, deepening on the arms, and darkest on the crown and between the shoulders. It would seem that the various species, however distinct in form of skull, are not to be very readily distinguished when prepared as stuffed specimens, unless indeed we had *adults* of each for comparison.

* Mr. Nicholls states, in a letter,—"I obtained the skeleton which I sent, through others, and therefore cannot be certain about its sex; but, if I remember right, it was given me as that of a male *Pappan*, full grown but not aged, and with a very broad face."

suppose Dr. Kneeland refers when he mentions "the narrow elongated shape of the Orang's pelvis."*

I shall now follow the list of admeasurements furnished by Prof. Owen of the adult and young small Chimpanzee and adult and young Orang-utan, and would have cited those given by him of his adult Orang for convenience of comparison, had his specimen been clearly a *Mias Rambi*, as the large skulls are which he has figured; but this is rendered doubtful in a note.† Another table of comparison by the same naturalist we quote to give the dimensions of the following skulls.—1. *Mias Rambi*, Bornean male (Owen).—2. Ditto, Sumatran male.—3. Ditto, Bornean female.—4. Ditto, Sumatran female (Owen).‡—5. *Mias Pappan*, lower jaw of Abel's Sumatran male.—6. Ditto, Bornean female (?)—7. *Mias Kassar*, male (? Owen).—8. Ditto, female.—9. *Mias Kassar* (?), adolescent female, with comparatively short fore-arms.

* *Ann. Mag. N. H.*, July, 1852, p. 27.

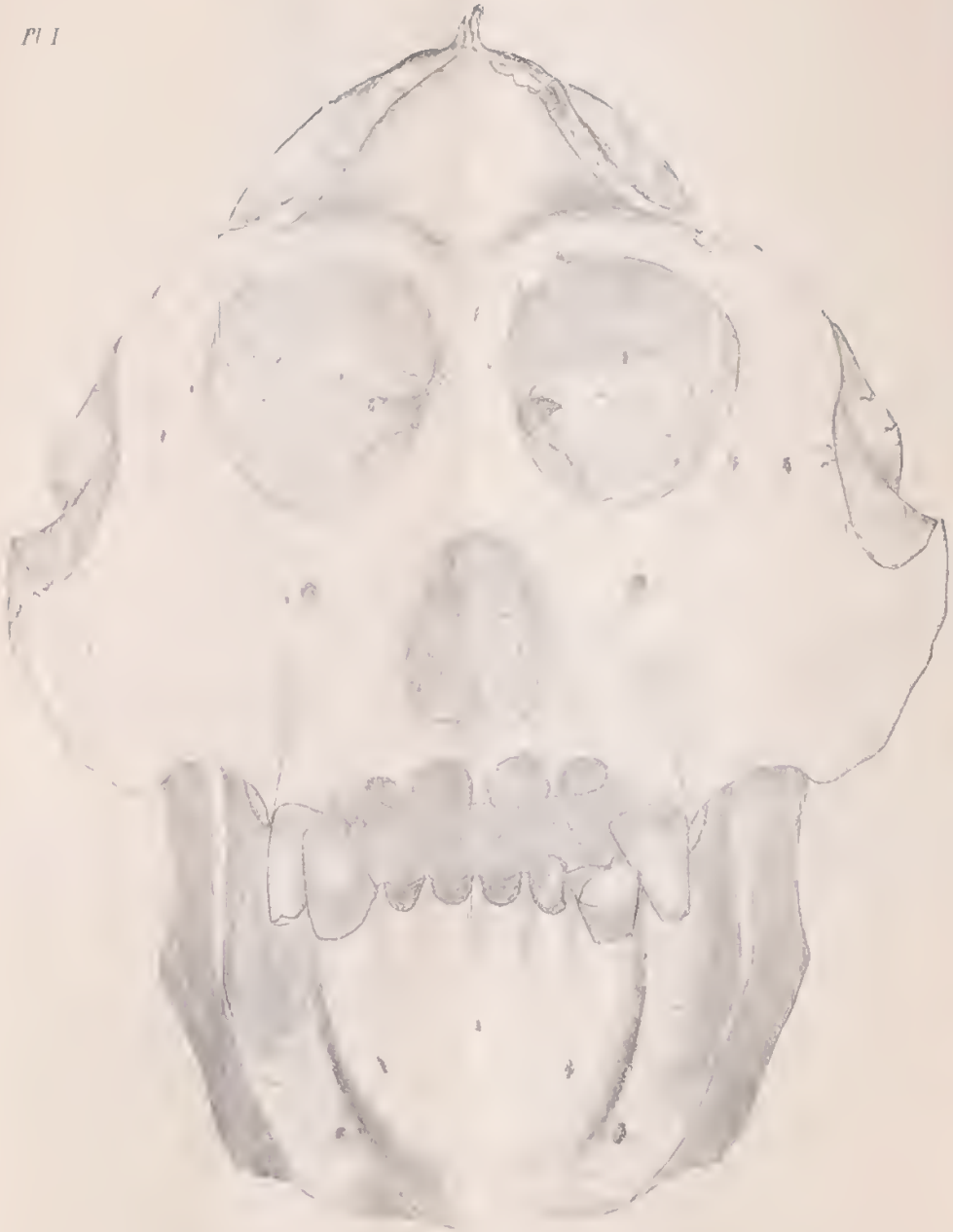
† In which Mr. Owen remarks—"The admeasurements in this column are taken, by permission of the Board of Curators, from the skeleton in the museum of the Royal College of Surgeons, in which the absence of the cranial ridges, and some still separate *epiphyses*, would indicate the non-attainment of full growth." It may, therefore, prove to be an adolescent *Mias Pappan*.

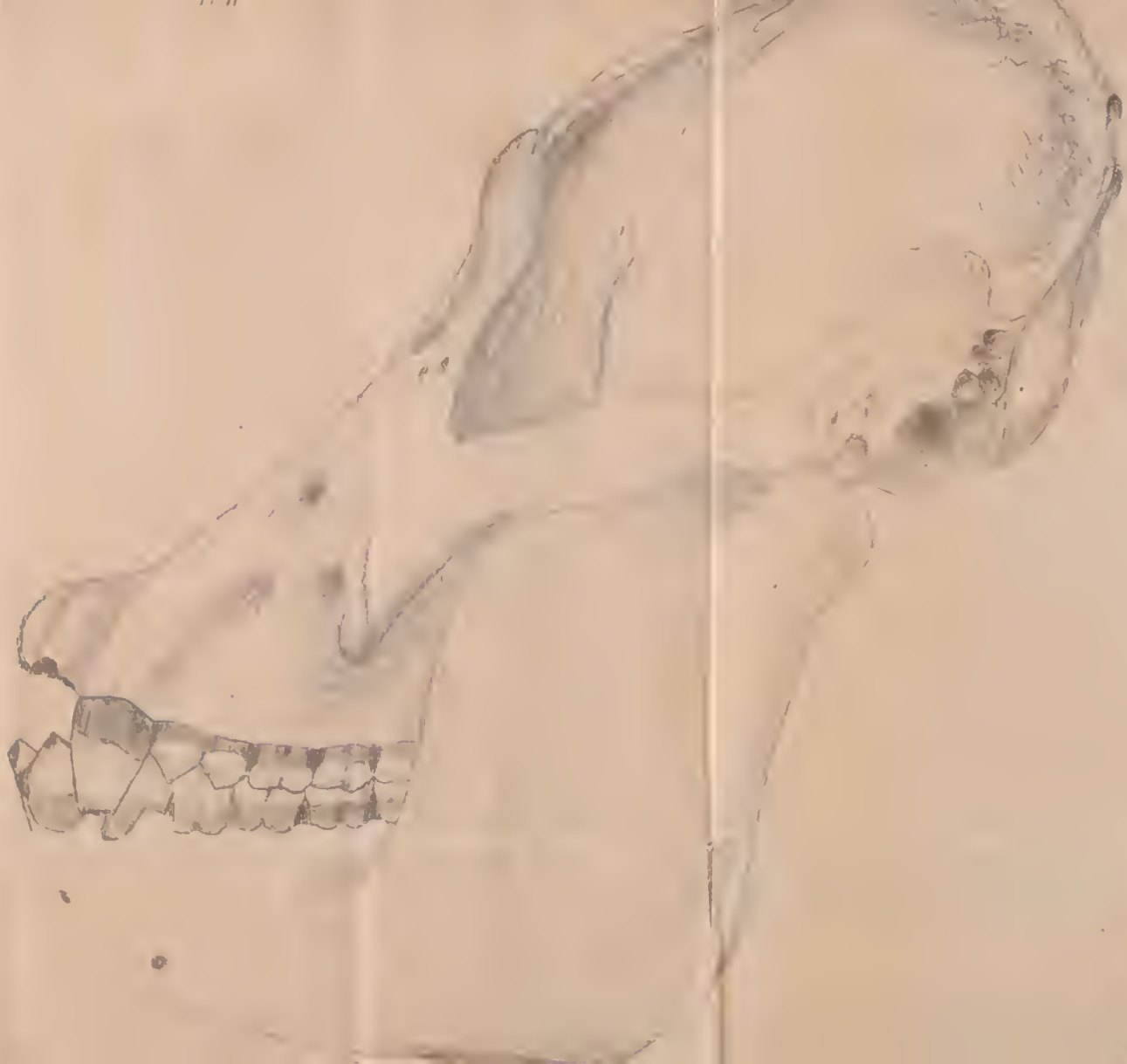
‡ The measurements in this column are taken from Mr. Owen's published lithographs.

*	M.R., B. M. (O) 1		M. R., S. M. 2		M. R., B. F. 3		M. R., S. F. (O) 4		M. P., S. M. (A) 5		M. P., B. F. (?) 6		M. K., M. (O) 7		M. K., F. 8		M.K. (?) 9	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
Length of the skull from the vertex to the base of the occipital condyle,	4	6	4	4	3	8	4	1	..		3	6	3	7	3	4	3	5
Length of the skull from the posterior plane of the occiput to the margin of the incisors, ...	10	6	10	3(?)	9	5	9	3	..		9	7	7	10	7	7*	7	7
Length of the skull from the posterior plane of the occiput to the fronti-nasal suture, ...	5	3	5	0	5	0(?)	4	8	..		5	3	4	4	4	5	4	8
Length of the skull from the fronti-nasal suture to the margin of the incisors, ...	5	7	5	5(?)	4	9	4	7(?)	..		4	7	4	$1\frac{1}{2}$	4	0	3	$2\frac{1}{2}$
Greatest lateral diameter of the skull (at the post-auditory ridges,)	5	4	6	1	5	2	5	$3\frac{1}{2}$	..		5	7	4	8	4	9	4	9
Smallest lateral diameter of the skull (behind the orbits,) ..	2	9	2	6	2	7	2	$7\frac{1}{2}$	..		2	6	2	4	2	4	2	$7\frac{1}{2}$
Distance between temporal ridges, ...		..	2	5	2	2		..	..		2	3	,,	7(?)	2	1	2	3
Diameter of the skull at the zygomata, ...	6	9	6	8	6	3	6	0	..		6	6	5	1	5	2	5	1
Length of the zygomatic fossa (measured from below,) ..	2	6	2	5	2	2	2	0	..		2	2	1	9	1	8	1	5
Diameter of skull taken between the outsides of the orbits. ..	4	6	5	1	4	4		..	..		4	5	3	6	3	$7\frac{1}{2}$	4	0
Inter-orbital space, ...	,,	7	,,	6	,,	5		..	..		,,	$4\frac{1}{2}$	,,	4	,,	4	,,	5
Transverse diameter of orbital cavity, ...	1	6	1	5	1	5		..	..		1	4	1	3	1	$2\frac{1}{2}$	1	$3\frac{1}{2}$
Vertical diameter of orbital cavity, .. .	1	7	1	8	1	7		..	..		1	7	1	6	1	5	1	$3\frac{1}{2}$
Vertical diameter of nasal aperture, ...	1	6	1	5	1	4		..	..		1	2	1	1	1	2	1	0
Transverse diameter of nasal aperture, .. .	1	0	1	$2\frac{1}{2}$	1	0		..	..		,,	9	,,	9	,,	9	,,	9
Interspace between infra-orbital foramina, ...	2	0	2	3	1	9		..	..		1	9	1	7	1	7	1	5
Distance between the inferior margin of the nasal bone and the inferior margin of the intermaxillary bone, ...	3	3	3	1	2	$7\frac{1}{2}$		..	..		2	7	2	5	2	$2\frac{1}{2}$	1	$7\frac{1}{2}$
From the anteror margin of the occipital foramen to the posterior margin of the bony palate, ...	2	10	3	5	3	$2\frac{1}{2}$	2	8	..		3	$2\frac{1}{2}$	2	3	2	6	2	$6\frac{1}{2}$
Length of the bony palate along the mesial suture, ..	4	0	4	0	3	6	3	$2\frac{1}{2}$	..		3	$7\frac{1}{2}$	3	$1\frac{1}{2}$	2	6	2	8
From the anterior margin of the intermaxillary bones to the anterior palatal foramina, ...	1	3	1	$2\frac{1}{2}$	1	0	,,	8	..		1	2	,,	10	,,	7	,,	$7\frac{1}{2}$
Breadth of the crown of the first incisor, upper jaw,	,,	7		..	,,	6	,,	$5\frac{1}{2}$	..		,,	6	0	6	0	5†	,,	5
Breadth of the crown of the second incisor, upper jaw, .	,,	4		..	0	$3\frac{1}{2}$(?)	0	$3\frac{1}{2}$	..		0	$3\frac{1}{2}$	0	$3\frac{1}{2}$	0	$3\frac{1}{2}$(?)	,,	3
Breadth of the four incisors, *in situ*, upper jaw, ...	1	9		..	1	7	1	$6\frac{1}{2}$	..		1	7	1	6	1	5	1	7
Longitudinal extent of grinding surface of the *molares*, bicuspides included, of one side, upper jaw, ...	2	5	2	$2\frac{1}{2}$	2	$1\frac{1}{2}$	1	$7\frac{1}{2}$	..		2	$2\frac{1}{2}$	2	2	2	0	2	0
Length of the enamelled crown of the canine tooth, upper jaw, ..	1	0		..		..		..	..		1	2	0	$6\frac{1}{2}$		..	,,	7
Breadth of ditto, ...	,,	9	0	8	0	7	0	7	..		0	$6\frac{1}{2}$	0	5	,,	5	,,	6
Length of the lower jaw from the condyle to the anterior surface of the sockets of the incisors, ...	7	4	7	3	6	3	6	7	6	3	6	$7\frac{1}{2}$	5	7	5	5	5	2
Length of the *ramus* of the lower jaw, ...	4	$7\frac{1}{2}$	4	$7\frac{1}{2}$	3	$7\frac{1}{2}$	4	2	4	0	4	0	3	4	3	5	3	5
Greatest breadth of ditto, ...	3	1	2	8	2	$7\frac{1}{2}$	2	9	2	$3\frac{1}{2}$	2	$7\frac{1}{2}$	2	0	1	8	2	0
Interspace between the mental foramina, ...	2	1	2	5	2	0		..	2	1	2	0	1	8	2	0	1	7

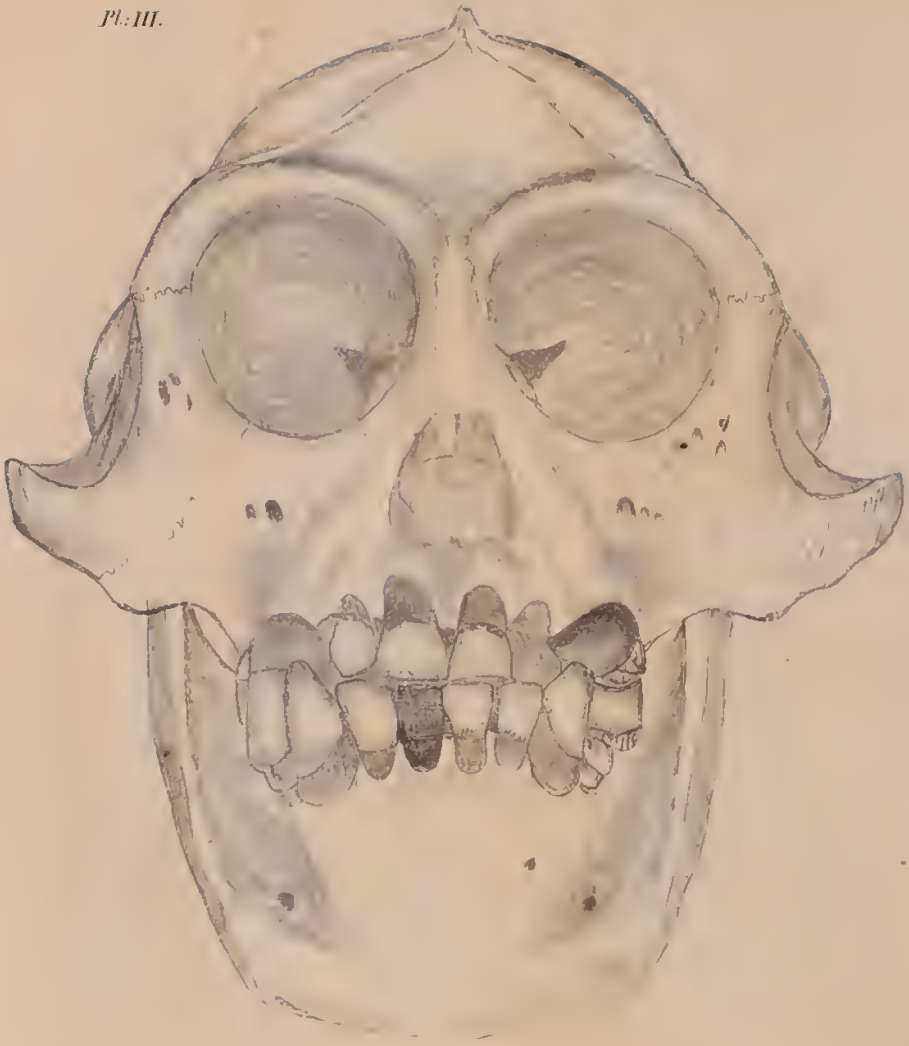
† Much shrunken.

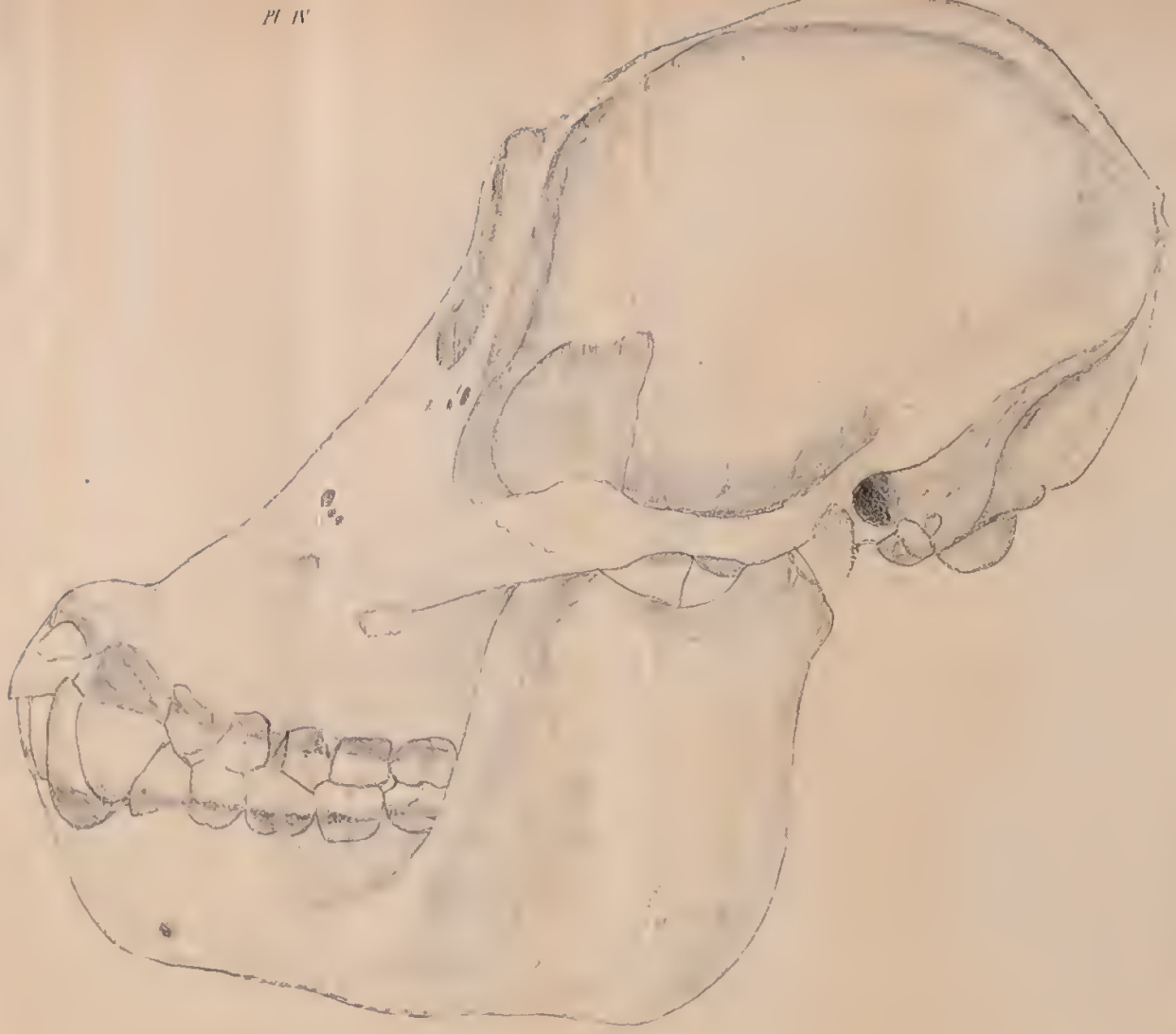
Pl I



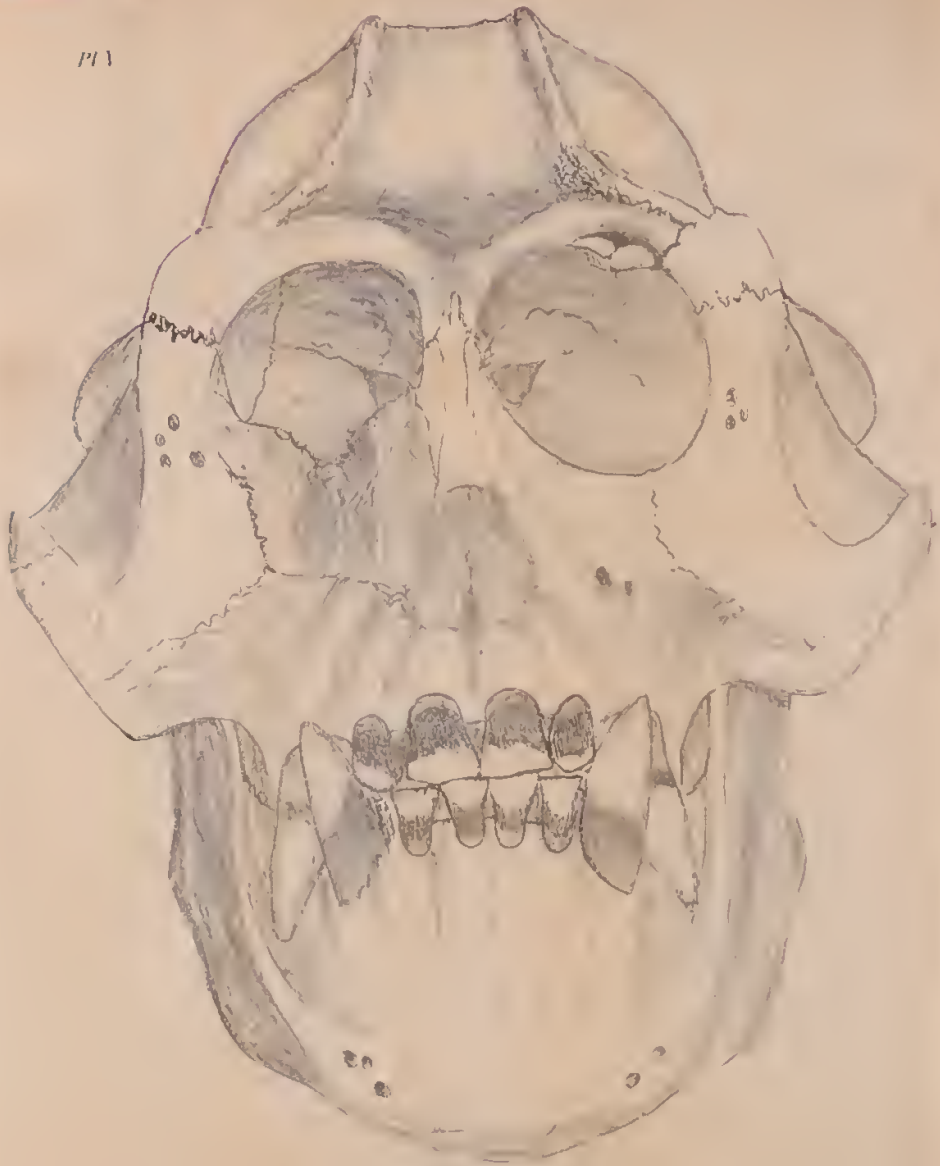


Pl. III.

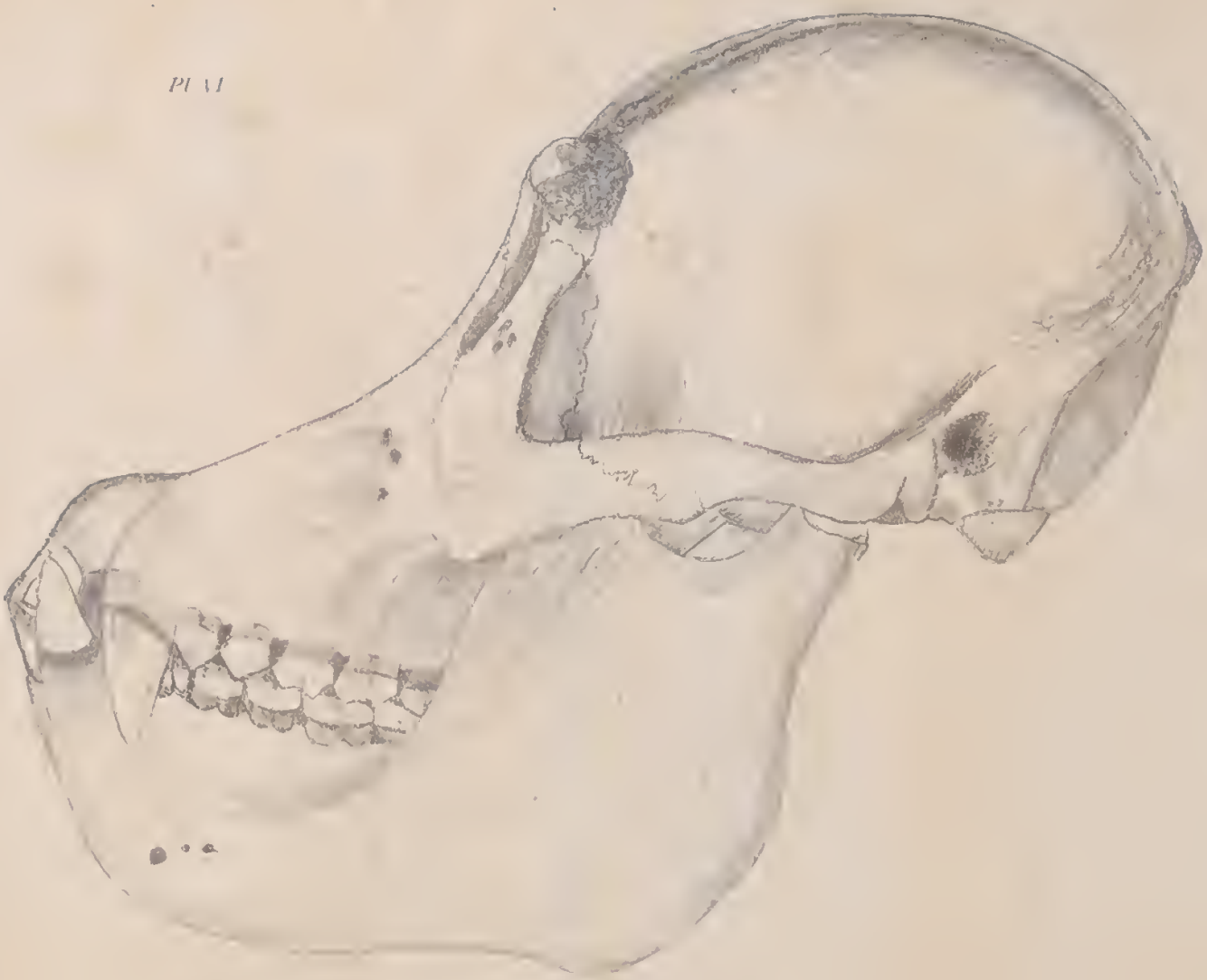


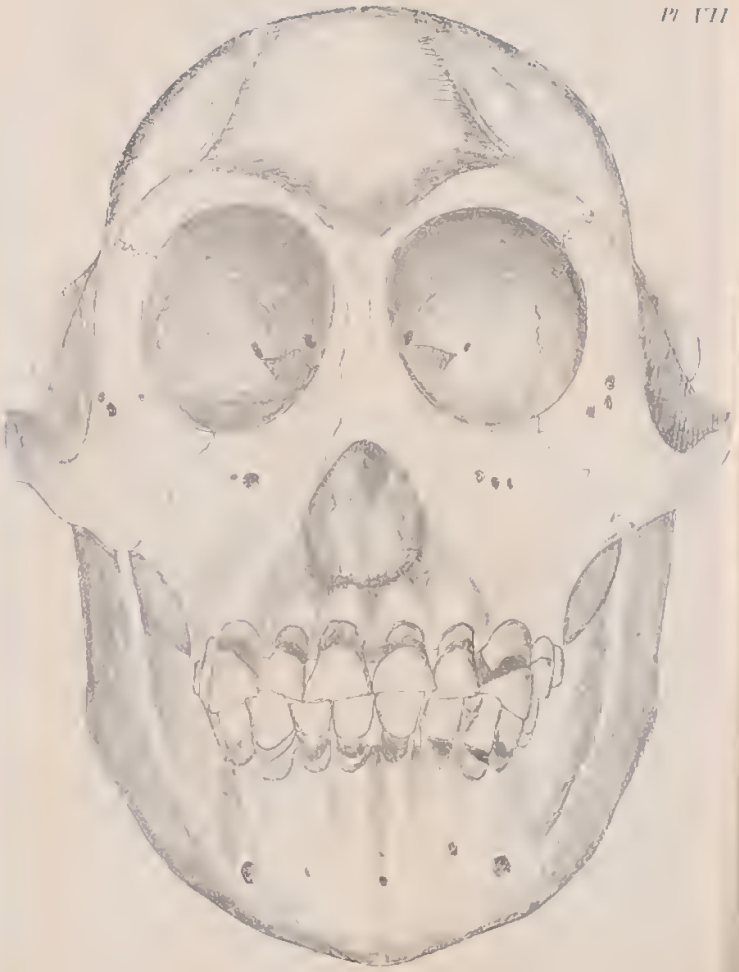


Pl 1

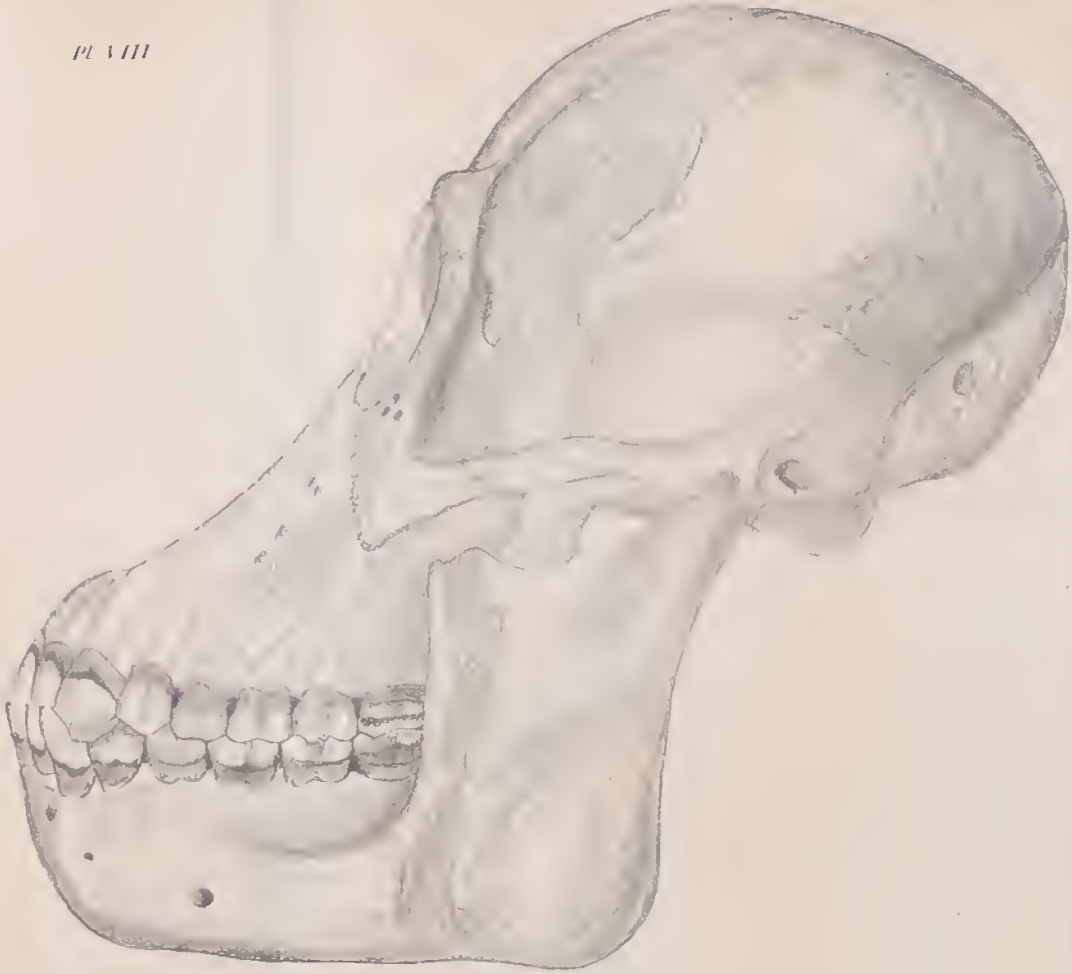


PLATE



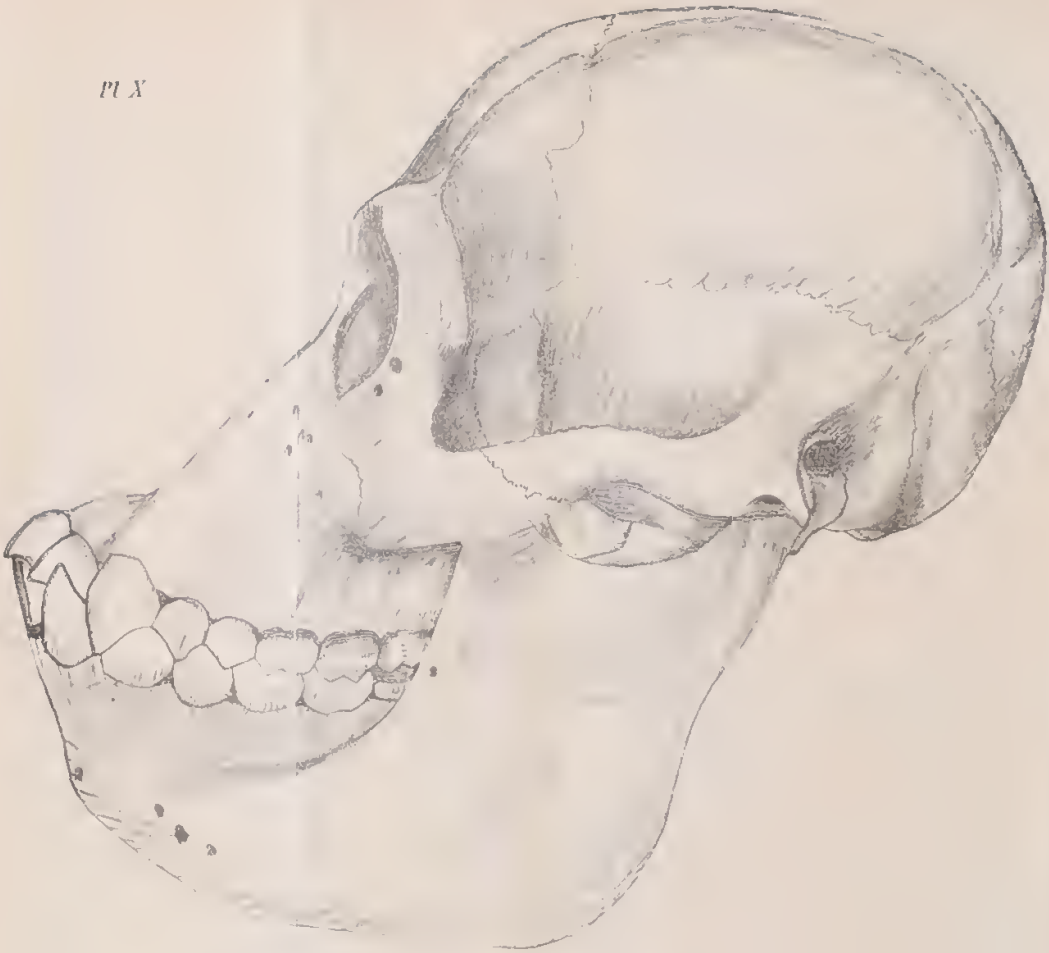


PL VIII



Pl IX

Pl X



In the following table of admeasurements, the first column gives those of an adult female *Rambi* by Prof. Owen; the second are those of our adult female (?) *Pappan;* the third are those of our aged female *Kassar;* and the fourth are those of our adolescent small female Orang with short fore-arms:—

	Adult female Rambi.			Adult female Pappan.			Aged female Kassar.			Short-armed.		
	F.	*i.*	*l.*	*F.*	*i.*	*l.*	*F.*	*i.*	*l.*	*F.*	*i.*	*l.*
Length of the body from the *vertex* to the base of the *os calcis*,*	4	1	6	3	9	6	3	4	0	3	3	3
Length of the spinal column, ...	1	11	6	2	0†	5	1	8†	0	1	8	9
Length of *sternum* (not including the ensiform cartilage,)	,,	4	4½	,,	4	0	,,	4	0	,,	4	4
Length of the *manubrium sterni*, ..	,,	1	5	,,	1	2	,,	1	3½	,,	1	3
Breadth of the *manubrium sterni*, . .	,,	2	4	,,	1	10½	,,	2	3	,,	1	9
Breadth of the *sternum* opposite the fifth rib, ...	,,	1	2	,,	1	4	,,	,,	10	,,	,,	11
Length of the first rib, ...	,,	2	7	,,	4‡	8	,,‡	3	9	,,‡	3	9
Length of the seventh rib, ...	1	4	6	1§	0	0	,,§	9	6	,,§	9	0
Length of the last rib (which is longer than in Man and has a cartilage,)	,,	6	2	,,	4	5	,,	3	0	,,	4	3
Length of *os innominatum*, ...	,,	9	10	,,	9	9	,,	8	6	,,	8	4
Breadth of *pelvis* from one antero-posterior spine of *ilium* to the other, ...	,,	9	10	,,	9	9	,,	8	6	,,	8	4
Breadth of *ilium*, ...	,,	4	9	,,	4	3	,,	4	0	,,	3	5
Breadth of *ischium*, ...	,,	3	7	,,	4	0	,,	3	5	,,	3	0
Breadth of *sacrum*, ...	,,	3	4	,,	3	1	,,	2	11	,,	2	9
Distance between the *acetabula*, ..	,,	5	5	,,	5	0	,,	4	7	,,	3	9
Length of the *clavicle*, .. .	,,	6	9	,,	6	9	,,	5	9	,,	5	5½
Length of the *scapula* along the base, ..	,,	5	5	,,	6	3	,,	5	5	,,	5	0
Breadth from the end of the *acromion* to the opposite part of the base, ..	,,	4	8	,,	4	6	,,	3	10	,,	3	6
From the root of the spine to the superior angle, ...	,,	1	4	,,	1	4	,,	,,	10	,,	,,	10

* In the second, third and fourth columns, the *height* of the skeleton is given, standing, *more humano*. In the second column 1 in. is allowed, and in the third ¾ in., for the height of the *astragalus* and *os calcis*. In the small Orang with short fore-arms, the height of these bones *in situbus* is ¾ in.

† The extremity of the *coccyx* is here allowed for.

‡ Measured round the curve from posterior articulation.

§ The osseous portion only.

	Adult female Rambi.			Adult female Pappan.			Aged female Kassar.			Short-armed.		
	F.	*i.*	*l*	*F.*	*i.*	*l.*	*F.*	*i.*	*l.*	*F.*	*i.*	*l.*
From the root of the spine to the inferior angle, ...	,,	4	3	..	4	3	,,	3	8	,,	3	0
From superior to inferior angle, ..		..		,,	5	10	,,	4	7	,,	4	3
Greatest breadth of *scapula*, .. .		..		,,	4	3	,,	3	3	,,	2	9
Length of the *humerus*, ...	1	1	4	1	2	6	1	0	9	1	0	6
Circumference of middle of trunk of *humerus*,		..		,,	3	2	,,	2	3	,,	2	0
Length of the *radius*,..	1	1	7	1	2	0	1	1	1	..	11	$2\frac{1}{2}$
Length of the *ulna*, ...	1	2	5	1	2	8	1	1	3	,,	11	$7\frac{1}{2}$
Length of the hand,*	,,	10	5		..			..		,,	8	,,
Length of fore-finger (metacarpal included†), ...	,,	8	5		..			..		,,	7	0
Length of metacarpal of middle finger, ..		..		,,	4	0		..		,,	3	$1\frac{1}{2}$
Length of first *phalanx* of middle finger,		..		,,	2	11	,,	2	9	,,	2	3
Length of first *phalanx* of little finger, ..		..		,,	2	$5\frac{1}{2}$	,,	2	3	,,	2	0
Length of the inferior or sacral extremity (to the base of the *os calcis*), ..	1	9	3	1	9‡	0	1	6‡	9	1	6	9
Length of the *femur*, ...	,,	10	3	,,	10	8	,,	9	9	,,	9	6
Circumference of middle of trunk of *femur*,		..		,,	2	9	..	2	$4\frac{1}{2}$	,,	2	$1\frac{1}{2}$
Length of the *tibia*, ...	,,	9	0	,,	9	2	,,	8	3	,,	8	3
Length of the *fibula*, ...	,,	8	7	,,	8	7	,,	7	$9\frac{1}{2}$	,,	7	$9\frac{1}{2}$
Length of the *patella*, ...	,,	,,	10	,,	,,	9	,,	,,	9	,,	,,	9
Breadth of the *patella*, ...	,,	,,	9	,,	,,	8	,,	,,	8	,,	,,	9
Length of foot,§	,,	,,	10		..			..		,,	9	3
Length of the *hallux*,..	,,	2	10		..			..		,,	2	$3\frac{1}{2}$
Length of the next toe, ...	,,	8	5		..			..		,,	6	10
Length of first *phalanx* of same, ..		..		,,	2	10	,,	2	9	,,	2	3
Length of second *phalanx* of same, .		..			..		,,	1	6	,,	1	3
Length of the little toe, ...	,,	7	0		..			..		,,	5	9

So many years have now elapsed since the fact of a plurality of species of this genus was established by Prof. Owen and Sir J. Brooke, that it cannot but occasion much surprize that the several species have not by this time been long accurately determined, and more especially when the greatly increased intercourse with Borneo is taken into consideration. Yet it seems that no progress whatever has been made in the enquiry since the publication of Sir J. Brooke's letter; and probably there is no collection yet in Europe, which can boast of so fine and demonstrative a series of Orang crania as those which are now figured.

* In Dr. Clarke Abel's male *Pappan*, the hand is about 11 in. long.

† In Abel's *Pappan* about $9\frac{1}{2}$ in.

‡ An inch allowed in the second column, and $\frac{3}{4}$ in. in the third, for the *astragalus* and *os calcis*.

§ In Abel's *Pappan* about 13 in.

Explanation of Plates.

Pl. I, II.—Skull of Pithecus Brookei, Bl: *P. Wurmbii* et *P. Abelii*, Owen (though neither the species described by Van Wurmb, nor that by Dr. Abel, a skull of which is figured in Pl. V, and VI); *Mias Rambi*, Brooke. Adult male, from Sumatra.

Pl. III, IV.—Ditto of aged female of the same, from Borneo.

Pl. V, VI.—Ditto of P. satyrus, (L.), apud Brooke, S. Müller, and others: *Mias Pappan*, Brooke. Adult female (?), from Borneo.

Pl. VII, VIII.—Ditto of P. morio, Owen: *Mias Kassar*, Brooke. Aged female, from Borneo.

Pl. IX, X.—Ditto of P. Owenii, Bl. Small Orang with short fore-arms. Adolescent female. Hab. unknown.

Description of Mohzarkhala in the Kohistan of the Western Huzara, extracted from the Journal of Mr. A. Gardiner. *By* M. P. Edgeworth, *Esq. B. C. S.*

On the 24th Feb. 1830, Mr. Gardiner started in company with Therman Shah, chief of the tribe of Khilzye, (a subdivision of the Huzara tribe Deh Kundi) and his brother, attended by a few followers, from Drohu the residence of the chief, in order to visit the spot called "the buried wealth of Moh" and certain caves in its neighbourhood.

They first descended about 2000 feet to the bottom of the valley, and crossed the deep and turbid torrent by means of a rope and withy bridge. Thence the path ascended north, and then north-east to the limit of the snow, crossed a bed of snow rather treacherous to the passenger, and came to a narrow gorge walled in with almost perpendicular rocks, but 15 to 20 feet wide, and lined with perpetual snow, on which no sun ever shines. Down this icy-bed the party let themselves slide as gently as they could in a sitting posture, avoiding the abrupt termination, out of which gushed a new-born torrent. Thence by a rocky path they reached an oval basin or small valley about 900—1000 yards long by 6—800 broad: all sides rapidly shelving towards the centre which contained a small pool about 150 yards in circumference, the traditional site of Moh's death.

This tarn is said to be unfathomable, but the most remarkable circumstance about it, is the bituminous nature of the water and its nauseously bitter taste. It imparts a stinging sensation to the naked skin, apparently similar to that felt from bathing in the Dead Sea. Mr. Gardiner imprudently waded into it, in a vain attempt to sound it, which he failed in doing with a line of 55 fathoms; and he suffered for sometime from the effect of the waters on his skin.

Occasionally balls of fire are said to play over the surface, which is probably owing to the escape of sulphuretted hydrogen gas. The waters, though intensely cold, have the appearance of ebullition, from the continual escape of gas. On one side was a deposit of sulphur.

Although fed from a glacier, the pool has no visible outlet, and is said never to change its level, save once during an earthquake when it rose several yards above its banks.

Proceeding to the south side of the valley they ascended a mound of loose debris, and found that the earthquake, that had occurred a few days before, had blocked up the mouth of two of the three caverns they went to see. The most westerly of them, however, was still accessible. The entrance, elevated a few feet above the ground on the face of a bluff rock, was nearly concealed by a veil of mossy vegetation fed by springs oozing from the rocks. On further examination, it proved to be of an irregular oval form, about $3\frac{1}{2}$ feet high by $2\frac{1}{4}$ broad. There were no marks of artificial labour visible on the rock, which seemed to be porphyritic, dark-red in colour, with black markings, and of extreme hardness. In position it rests on granite, and lies below primitive limestone. The glacis below is formed of a confused mixture of granite, greenstone and limestone.

Lighting their torches of split pine, they entered the cave. The first adit, for about 75 feet long, gradually enlarged, (they could only pass in a crouching posture), then it again contracted, but finally opened into an apartment 20×15, and eight feet high in the centre.

At the further end of this room was a rude image in high relief on a smoothed and squared surface, about $4\frac{1}{4}$ feet high. Two short and thick legs supported a large thick body surmounted by four extended arms, and two heads rising from one thick neck.

Over the head were some emblems which Mr. Gardiner supposes to mean the sun and moon, but which, from the sketch he gives, I

should rather describe as decrescents, one over the right head and two over the left. In size, the heads would be better suited to a colossus of 10 feet. The ears, eyes, nose and even the fingers were almost worn off. The figure had been originally highly polished; now a good deal worn and covered with a green vegetable scum.

The floor of the cave was level, except in one place, about 3 feet from the idol, where there was a hollow about two yards round. This was the spot where sacrifices used formerly to be made, and even then it was found filled with ashes and traces of recent fire.

On either side at about three yards from the great idol, were two smaller ones, both single-headed and two-armed, but otherwise, in rudeness and disproportion, resembling the chief idol.

The chief idol was said to represent Moh and his wife Mábún, formerly the gods of those regions, and even still reverenced by the half-converted Musalmáns of the country. No one dares enter the caves with shoes on, and the marks of recent fire show still stronger signs of remaining veneration.

The other two caves, whose mouths had been lately blocked up, were dedicated—one to Sheh or Seh, the destroyer, the other to Zhei, the god of fire.

About four miles further on, it is said, that there were two other caves since become inaccessible, dedicated to Hersh and Maul.

At each new moon a fire-offering is made before the cave of Zhei by some of the Therba tribe, who retain more of paganism than Islám; and these people reckon their time by moons, instead of years.

Descending to the western limit of the valley, the high cliff for the space of 2 or 300 yards was perforated with small holes, like a rabbit-warren. This was the site of Moh's treasure. The holes are made by the natives digging for it, and they frequently succeed in finding small beads of gold and stone known by the name of Solymani Dana, or Solomon's grain. The beads were for the most part agate or jasper, all more or less corroded and dimmed in colour, as if by fire; they were all bored. The golden grains had just the appearance of the little masses of gold which are made by gold-washers from the first melting of their amalgam and gold-dust; about the size of wheat grains.

This bank consists of a confused mass of boulders, granite, limestone, clay-slate and greenstone, all heaped upon a thick stratum of sandstone of varying quality, some argillaceous, some ferriferous of a deep red colour, and with some traces of lignite, alum earth and iron-pyrites. In this sandstone are the holes where the beads are found.

There are also found pieces of broken pottery in the neighbourhood and among the debris. Mr. Gardiner concludes that the tarn is the crater of an extinct volcano, and that former eruptions with earthquakes demolished some ancient place of abode.

The following is the legend of Moh. Moh created the earth, and his wife Mábún created the wilderness. From them sprung the first giant race. They slept alternately for 999 moons and reigned 450,000 moons. After this period three sons rebelled, viz. Sheh the life-destroyer, Zhei the fire-god, and Maul the earth-quaker, and by their combined efforts Moh was buried beneath the mountains. Confusion lasted 5000 moons—after which the three victors retired each to his own region for 10,000 moons.

Maul was lost in darkness of his own creating. Sheh fled with his family towards the sun, which so much enraged Zhei, that he caused fire to spread over the earth; this was quenched by the spirit of Mábún, but not till the whole giant race was destroyed and the earth remained a desert for 3000 moons. Then Hersh and Lethram, originally slaves of Moh and great magicians, emerged from the north, and settled in these mountains. By some Lethram is considered as the incarnate spirit of Mábún and the Queen to whom Hersh was vizier. Hersh had three sons Uz, Muz and All.* These he left in charge of all their families, while with a large army he travelled toward the sun in pursuit of Sheh, who was supposed to be still living.

So the three sons of Hersh and their descendants reigned happily for 18,000 moons till Khoor (Cyrus ?) invaded and conquered the country; but after many years' struggle they expelled the invader and retained the name Khoorkush (Cyrus-killer), now Khirghiz. The descendants of Hersh continued to reign for 10,000 moons more till Khoondroo (Alexander ?) invaded the country, after which no separate legend of them seems to be recollected.

* Whose names seem retained in the Uztagh, Muztagh and Altai mountains.

Contributions to the Statistics of Bengal,—Income, Expenditure and Food.—By J. R. Bedford, *Esq. Bengal Medical Staff.*

The relation between income and expenditure existing in any given community, affords a fair index to the soundness of its condition, and general prosperity. If the average rate of labour be such as to provide all able-bodied men and their families with a sufficiency of food, clothing and shelter, it must be conceded that such a population is in the possession of some of the primary, if not most important, elements of happiness, as applicable to a certain stage of civilization.

It has been, and is, the custom to represent the peasant-inhabitant of Bengal as weighed down by the pressure of land taxation to a point at which he can barely support life. That great suffering occasionally arises from the local deficiency of the staple article of food, must be conceded, but such is due to imperfect means of intercommunication, rather than inability to meet its average cost. As far as my own experience goes, the average income of the Bengal peasantry, by which term I desire to express, small landed proprietors, day-labourers, and the general mass of the people, suffices for all the necessary outlay of their position. It is an incontrovertible fact that debt largely prevails, but this would appear to be due rather to the enormous rate of interest which is taken and the comparatively excessive sums lavished on occasional ceremonies, than upon any actual necessity, in regard to the necessaries of life.

Desirous of attempting some analysis of the condition of the people, I constructed the following Table when in charge of the Civil Station of Chittagong. The subjects of inquiry were, patients attending the Dispensary. Their ailments were first attended to, and the facts tabulated below, obtained by inquiry immediately afterwards, through the zealous assistance of Bábu Buddináth Brimo, the Sub-Assistant Surgeon.

They are not offered as absolute truths. Those who have had any practical experience of the great difficulty of making statistical inquiries in Bengal, will fully understand how far they may deviate from correctness. But examining the facts here noted seriatim,

I think sufficient intrinsic evidence of their reliability will be found to confer upon them the character of approximate truths. The Table comprehends every ordinary item of expenditure, except that incurred on account of live-stock, which has been accidentally omitted, and the probable amount of which must of course be deducted from the balance when in favour.

With the view of rendering the questions and consequent information as clear as possible, it was agreed that the inquiry should embrace the condition of its subjects during the past twelve months only.

[*See* TABLE A.]

The above Table speaks for itself. To compute the mean of each item of expenditure would be useless labour. It may be remarked, however, that according to column 3, out of the one hundred men subjected to examination, seventy-seven were married, out of which number only four had more than one wife. By summing up column 4 we obtain a total of one hundred and twenty-one children or only 1.57 per marriage. This appears a very small number, but the source of error is difficult to detect, as all children of whatever age living in the house, must have been included.

The mean wages of the husbands amount to Co.'s Rs. 3-3-5, whilst those of the wives are 3as. 1p.; Columns 12 and 13 show us that whilst by far the largest proportion of the sums devoted to food is spent in rice, dhal is consumed in very small quantity. The outlay on salt exhibits a large figure in column 14, whilst col. 29 was formed with the view of ascertaining whether they obtained a sufficiency of this important condiment. Fish, as might naturally be expected at a sea-port, is universally consumed in preference to the meat, which constitutes a part of the Musulman's diet in the more inland districts. The outlay on fuel (column 20) is very small and by no means general. This circumstance is probably due to its having been procured for the most part by the hand-labour of some portion of the family. The almost universal use of tobacco and the proportionate sum devoted to it, bear an important relation to the fact of this necessary of life to a Bengali having been lately prohibited in our jails, as a too luxurious source of enjoyment.

Table A.

Table exhibiting the monthly income and expenditure of 100 *Families in Zillah Chittagong, Bengal,* 1849. *In Rupees, Annas and Pie.*

	Name.	1 Caste.	2 Employment.	No. of Dependents. 3 Wives.	4 Children.	5 Brothers, &c.	Income per Month. 6 Husband. R. A. P.	7 Wife. R. A. P.	8 Other Members of family. R. A. P.	9 Monthly produce of Land R. A. P.	10 Total. R. A. P.	11 No. of livestock.	Monthly expenditure of whole Family. 12 Rice. R. A. P.	13 Dhal. R. A. P.	14 Salt. R. A. P.	15 Fish. R. A. P.	16 Meat. R. A. P.	17 Pepper and spices. R. A. P.	18 Vegetables R. A. P.	19 Milk. R. A. P.	20 Fuel. R. A. P.	21 Tobacco. R. A. P.	22 Oil. R. A. P.	23 Clothing. R. A. P.	24 Schooling. R. A. P.	25 Rent of House. R. A. P.	26 Rent of Land. R. A. P.	27 Total. R. A. P.	28 Balance. R. A. P.	29 Is supply of salt sufficient?
	Abdoolgooney, ...	M.	Rope-maker	1	0	2	5 0 0	0 0 0	0 0 0	0 0 0	5 0 0	2 Cows.	2 8 0	0 1 0	0 3 0	0 12 0	..	0 5 0	0 8 0	..	..	0 2 6	0 4 0	0 7 0	..	0 0 0	0 0 0	5 2 6	*0 2 6	Yes.
	Rohomut ally,.....	M.	Ryot.	1	4	0	3 0 0	0 8 0	0 12 0	0 0 0	4 4 0	.	1 8 0	0 2 0	0 4 0	0 6 0	..	0 3 0	0 2 0	..	..	0 2 0	0 2 0	0 8 0	..	0 1 0	0 0 0	3 6 9	0 13 3	Ditto.
	Magun ally, ...	M.	Servant.	0	0	5	1 0 0	0 0 0	3 5 0	0 4 0	4 9 0	2 Cows.	2 0 0	0 1 0	0 3 0	0 2 0	..	0 4 0	0 3 0	..	..	0 1 6	0 2 0	0 4 0	..	0 0 3	0 0 3	3 5 0	1 4 0	Ditto.
	Cassim ally, ...	M.	Ryot.	2	4	0	4 0 0	0 2 0	0 0 0	0 10 6	4 12 6	5 Cows.	3 12 0	0 1 0	0 4 0	0 2 6	..	0 4 0	0 1 0	..	..	0 4 0	0 2 0	0 8 0	..	0 1 0	1 10 6	7 2 0	*2 5 6	Ditto.
5	Samud ally,.....	M.	Ditto.	1	1	0	1 0 0	0 0 3	0 0 0	1 14 0	3 1 0	2 Cows.	1 0 0	0 0 0	0 3 0	0 1 0	..	0 3 0	0 4 0	..	..	0 1 0	0 0 0	0 4 0	..	0 0 6	1 0 0	3 1 0	0 0 0	Ditto.
	Wazir ally,.....	M.	Peon.	0	0	4	4 0 0	0 0 0	0 0 3	0 2 0	6 3 0	..	1 8 0	0 1 0	0 2 0	0 2 0	..	0 3 0	0 3 0	..	0 2 0	0 1 0	0 0 1	0 6 0	..	0 0 0	0 4 0	2 15 0	0 3 4	Ditto.
	Callo, ...	M.	Ryot.	1	3	5	3 0 0	0 5 0	0 11 0	0 0 0	4 0 0	4 Cows.	2 0 0	0 0 0	0 8 0	0 2 0	..	0 3 0	0 0 0	..	..	0 1 0	0 0 0	0 6 0	..	0 1 0	1 4 0	4 7 6	*0 7 6	Ditto.
	Kistomungul, ...	H.	Ditto.	1	2	1	3 8 0	0 0 0	0 0 0	1 8 6	5 0 6	..	2 0 0	0 1 6	0 4 0	0 4 0	..	0 3 6	0 0 0	..	0 2 0	0 1 0	0 1 0	0 7 0	..	0 0 6	0 12 0	4 4 6	0 12 0	Ditto.
	Tunnu, ...	M.	Cooly.	1	0	3	3 0 0	0 4 0	2 0 0	0 3 0	5 7 0	.	1 4 0	0 3 0	0 2 0	0 4 0	..	0 4 0	0 4 0	..	..	0 0 0	0 2 0	0 4 0	..	0 0 6	0 3 0	2 14 6	2 8 6	Ditto.
10	Meahjan, ...	M.	Mangee.	1	0	0	3 0 0	0 4 0	0 0 0	0 4 0	3 8 0	12 Cows.	1 0 0	0 1 0	0 2 0	0 2 0	..	0 2 0	0 4 0	0 2 0	..	0 1 0	0 1 0	0 4 0	..	0 0 6	0 1 0	2 4 6	1 3 6	Ditto.
	Hyder ally,.....	M.	Cooly.	1	3	0	2 8 0	0 3 0	0 12 0	0 0 0	3 7 0	1 Cow.	1 8 0	0 0 0	0 2 0	0 2 0	..	0 2 0	0 2 0	..	..	0 1 0	0 1 0	0 3 0	..	0 0 6	0 6 0	2 11 6	0 11 6	Ditto.
	Dwan ally, ...	M.	Ditto.	1	2	1	4 0 0	1 2 0	0 6 0	0 2 6	5 10 6	..	1 8 0	0 0 0	0 2 0	0 8 0	..	0 2 0	0 8 0	..	..	0 3 0	0 1 0	0 3 0	..	0 0 6	1 0 0	4 3 6	1 7 0	Ditto.
	Azgur ally, ...	M.	Ditto.	1	1	1	1 0 0	0 0 0	0 3 0	1 3 6	1 10 6	..	1 0 0	0 0 0	0 1 0	0 1 0	..	0 1 0	0 1 0	..	..	0 0 0	0 0 0	0 2 0	..	0 0 6	0 12 0	0 2 2	*1 8 0	Ditto.
	Amud ally,.....	M.	Ryot.	1	0	2	2 0 0	0 0 0	4 0 0	0 0 0	6 0 0	2 Cows.	1 0 0	0 1 0	0 4 0	0 8 0	..	0 4 6	0 1 0	0 8 0	0 4 0	0 2 0	0 4 0	0 5 6	..	0 1 0	0 0 0	0 3 10	6 2 5	Ditto.
15	Ahumud ally, ...	M.	Tindal.	1	0	3	8 0 0	0 0 0	0 0 0	0 0 0	8 0 0	..	1 0 0	0 0 0	0 2 0	0 1 0	..	0 3 0	0 2 0	0 1 0	..	0 2 0	0 2 0	0 6 0	..	0 0 6	0 1 3	3 3 9	4 12 3	Ditto.
	Mahomed Hossen,..	M.	Ryot.	2	2	1	4 0 0	1 0 0	0 0 0	0 0 0	5 0 0	3 Cows.	2 4 0	0 0 6	0 4 0	0 1 0	..	0 6 0	0 4 0	0 6 0	..	0 1 0	0 4 0	0 2 6	..	0 1 0	0 0 0	3 5 0	1 5 0	Ditto.
	Rohomut ulla, ...	M.	Ditto.	1	0	7	7 0 0	0 0 8	0 0 0	0 0 0	7 8 0	..	3 0 0	0 0 0	0 2 0	0 2 0	..	0 10 0	0 4 0	..	..	0 2 0	0 4 0	0 5 0	..	0 1 0	0 9 0	5 7 0	2 1 0	Ditto.
	Suffer ally, ...	M.	Bhisty.	0	0	1	2 8 0	0 0 0	0 8 0	0 0 0	3 0 0	..	1 0 0	0 2 0	0 1 0	0 2 6	..	0 1 0	0 4 0	..	0 4 0	0 2 0	0 2 0	0 4 0	..	0 0 6	0 0 6	2 7 6	0 8 6	Ditto.
	Abdool ally, ...	M.	Rope-maker	1	1	3	5 0 0	0 4 0	0 0 0	0 9 0	5 13 0	..	2 0 0	0 2 0	0 2 0	0 8 0	..	0 1 0	0 4 0	0 8 0	..	0 4 0	0 3 0	0 6 0	..	0 0 0	0 2 0	4 0 6	1 12 6	Ditto.
20	Teluck, ...	H	Dobey.	1	0	2	5 0 0	0 0 0	0 4 0	0 0 0	9 0 0	..	2 0 0	0 0 0	0 2 0	1 14 0	..	0 2 0	0 8 0	..	1 0 0	0 8 0	0 0 0	0 2 0	..	0 1 0	0 1 3	7 6 3	1 9 9	Ditto.
	Woomed ally, ...	M.	Cooly.	1	0	0	1 8 0	0 0 2	0 0 0	0 0 6	2 0 0	2 Cows.	1 4 0	0 0 0	0 1 0	0 0 0	..	0 2 0	0 1 0	..	..	0 0 0	0 0 6	0 2 0	..	0 0 0	0 0 0	0 1 12	0 4 0	Ditto.
	Annu, ...	M.	Ryot.	1	2	6	2 0 0	0 0 0	0 2 0	0 2 0	6 0 0	1 Cows.	2 0 0	0 1 0	0 4 0	0 4 0	..	0 8 0	0 4 0	..	0 1 6	0 2 0	0 2 0	0 5 0	..	0 2 0	1 4 0	5 5 6	0 10 6	Ditto.
	Cully Doss,.....	H.	Bearer.	1	0	5	2 0 0	0 0 0	0 2 0	0 2 10	6 10 0	Buffalo.	1 0 0	0 0 0	0 4 0	0 4 0	..	0 4 0	0 8 0	..	..	0 2 0	0 2 0	0 4 0	..	0 1 0	2 6 0	5 3 0	1 7 0	Ditto.
	Sooker Mahomed, ..	M.	Chowkidar.	1	1	0	2 8 0	0 8 0	0 0 0	0 0 1	0 3 1	..	1 0 0	0 0 0	0 1 0	0 4 0	..	0 4 0	0 2 0	..	0 1 0	0 1 0	0 5 0	0 1 0	..	0 0 6	0 0 0	2 2 1	3 0 12 9	Ditto.
25	Tazu, ...	M.	Shopkeeper.	0	0	2	2 0 0	0 0 0	0 2 0	0 1 8	0 5 8	..	1 8 0	0 1 0	0 2 0	0 8 0	..	0 4 0	0 2 0	.	0 4 0	0 1 6	0 1 6	0 8 0	..	0 0 9	0 0 0	3 8 9	1 15 3	Ditto.
	Sookloll, ...	H.	Priest.	1	1	1	15 0 0	0 0 0	0 0 0	0 15 0	0 0 1	1 Cow.	2 0 0	0 4 0	0 2 0	0 1 0	0 1 0	0 1 6	0 4 0	..	0 8 0	0 8 0	0 1 4	0 6 0	..	0 1 0	0 0 0	6 16 0	8 6 0	Ditto.
	Acbur ally, ...	M.	Bricklayer.	1	2	3	3 0 0	0 0 8	0 0 0	0 0 0	3 8 0	..	1 8 0	0 0 0	0 1 0	0 2 0	..	0 1 6	0 1 0	..	..	0 0 9	0 1 0	0 3 0	..	0 0 0	0 1 0	2 3 3	1 1 3	Ditto.
	Nazam ally, .. : ..	M.	Ryot.	0	0	3	3 0 0	0 0 0	0 1 0	0 10 0	4 10 0	2 Cows.	2 8 0	0 0 0	0 2 0	0 0 0	..	0 2 0	0 2 0	..	..	0 0 0	0 0 1	0 4 0	..	0 0 6	0 8 0	3 11 6	0 14 6	Ditto.
	Latuah, ...	M.	Servant.	0	0	1	2 0 0	0 0 0	0 1 6	0 0 0	0 3 6	..	1 4 0	0 0 0	0 2 0	0 4 0	..	0 1 6	0 2 0	..	..	0 1 0	0 0 1	0 1 0	..	0 0 0	0 0 0	2 0 6	1 5 6	Ditto.
30	Muddunnesh, ...	M.	Cooly.	0	0	1	1 0 0	0 0 0	0 1 0	0 1 0	0 3 0	..	1 0 0	0 0 0	0 2 0	0 1 0	..	0 1 6	0 2 0	..	..	0 1 0	0 1 0	0 1 0	..	0 0 3	0 0 8	0 2 1	3 0 14 9	Ditto.
	Hassencali, ...	M.	Ditto.	1	3	0	3 0 0	0 2 0	0 0 0	0 0 0	0 3 2	..	1 0 0	0 0 0	0 1 0	0 4 0	..	0 1 6	0 4 0	..	..	0 0 9	0 1 0	0 4 0	..	0 1 0	0 0 0	0 2 1	9 1 0 3	Ditto.
	Samud ally,.....	M.	Shopkeeper	1	0	0	4 0 0	0 0 0	0 0 0	0 0 0	4 0 0	..	1 0 0	0 0 1	0 0 1	0 1 0	..	0 7 0	0 2 0	..	0 2 0	0 0 2	0 0 8	0 0 8	..	0 2 0	0 0 0	3 6 6	0 9 6	Ditto.
	Hussan ally, ...	M.	Syce.	1	0	4	3 0 0	0 0 0	0 1 8	0 0 2	0 4 10	..	2 0 0	0 1 6	0 4 0	0 4 0	..	0 3 0	0 2 0	..	..	0 2 0	0 0 2	0 5 0	..	0 1 0	0 0 0	6 3 9	0 1 1	Ditto.
	Mahomed Cassim, ..	M.	Chowkidar.	1	1	2	3 8 0	0 4 0	0 0 0	0 0 0	6 9 4	2 9	2 0 0	0 0 1	0 2 0	0 6 0	..	0 1 3	0 1 0	..	0 3 0	0 2 0	0 1 0	0 4 6	..	0 1 0	0 0 0	1 2 9	0 0 0	Ditto.
35	Samud ally, ...	M.	Ryot.	1	4	7	4 0 0	0 0 0	0 1 0	0 0 8	5 8 0	3 Cows.	3 0 0	0 4 0	0 6 0	0 2 6	..	0 4 0	0 8 0	.	0 4 0	0 0 8	0 0 1	0 10 0	..	0 2 6	0 2 0	6 3 6	*0 11 6	Ditto.
	Hamza, ...	M.	Syce.	0	0	4	5 0 0	0 0 0	0 0 4	0 1 4	0 6 8	4 Cows.	1 12 0	0 0 4	0 0 2	0 0 4	0	0 2 0	0 3 0	..	..	0 2 0	0 0 5	0 12 0	..	0 1 3	0 9 0	1 8 3	1 15 9	Ditto.
	Chunder Sing,.....	H.	Burcundaz.	1	1	0	4 0 0	0 4 0	0 0 0	0 0 0	4 4 0	.	1 0 0	0 0 4	0 0 2	0 2 0	0	0 2 0	0 2 6	..	..	0 1 0	0 0 1	0 0 4	..	0 1 6	0 10 0	2 12 6	1 7 6	Ditto.
	Cally Doss,.....	H.	Cooly.	1	0	3	2 0 0	0 3 0	0 0 0	0 0 8	0 2 11	2 Cows.	2 0 0	0 0 0	0 3 0	0 0 0	0	0 2 0	0 2 0	..	..	0 1 0	0 0 2	0 4 6	..	0 0 6	0 4 0	0 3 3	*0 8 0	Ditto.
	Ramkanno, ...	H	Ditto.	0	0	1	2 0 0	0 0 0	0 4 0	0 0 2	0 6 2	..	1 8 0	0 0 0	0 6 0	0 4 0	0	0 4 0	0 2 0	..	..	0 0 9	0 1 0	0 4 0	..	0 0 9	0 1 6	2 13 6	3 4 6	Ditto.
40	Futtey ally, ...	M.	Ditto.	1	3	0	3 0 0	0 4 0	0 0 0	0 2 0	3 6 0	..	2 0 0	0 0 0	0 2 0	0 0 0	0	0 1 0	0 2 0	..	..	0 2 0	0 1 0	0 4 0	..	0 0 9	0 1 0	3 0 9	0 5 3	Ditto.
	Toofan ally, ...	M.	Servant.	1	4	0	3 0 0	0 0 0	0 0 0	0 0 8	0 3 8	..	1 4 0	0 0 1	0 0 2	0 2 0	0	0 4 0	0 1 0	..	..	0 1 0	0 0 1	0 6 0	..	0 2 0	0 2 0	2 10 6	0 14 0	Ditto.
	Muttey jan,.....	M.	Ryot.	0	0	5	4 0 0	0 0 0	3 11 0	0 0 0	7 11 0	2 Cows.	2 8 0	0 1 6	0 2 0	0 1 0	0	0 12 0	0 2 0	..	..	0 2 0	0 0 4	0 4 0	..	0 4 0	0 0 0	3 5 7	9 2 3 3	Ditto.
	Hussen beck, ...	M.	Servant.	1	0	0	3 0 0	0 0 0	0 0 0	0 0 0	3 0 0	..	1 0 0	0 0 4	0 0 2	0 0 0	0	0 9 0	0 4 0	..	..	0 0 0	0 0 4	0 0 2	..	0 2 0	0 0 0	2 11 9	0 4 3	No.
	Amzut ally,.....	M.	Ditto.	1	1	6	3 0 0	0 0 12	0 4 0	0 0 4	0 8 0	1 Cow.	1 10 0	0 0 0	0 0 2	0 0 4	0	0 6 0	0 4 0	..	0 1 0	0 2 0	0 0 6	0 12 0	..	0 4 0	0 0 1	4 4 6	3 11 6	Yes.
45	Assud, ...	M.	Ryot.	1	1	1	3 0 0	0 0 5	0 0 0	0 1 14	0 5 3	3 Cows.	1 8 0	0 0 0	0 0 4	0 0 0	0	0 6 0	0 2 0	..	..	0 5 0	0 2 0	0 5 0	..	0 1 0	0 0 9	3 10 0	1 9 0	Ditto.
	Wally, ...	M.	Burkundaz.	1	0	5	2 12 0	0 0 0	0 1 8	0 0 4	0 4 8	..	2 0 0	0 0 0	0 2 0	0 0 0	0	0 5 0	0 0 0	..	..	0 1 6	0 4 0	0 5 0	..	0 2 0	0 1 9	3 5 3	1 2 9	Ditto.
	Abdool ally, ...	M.	Boatman.	0	0	3	5 0 0	0 0 0	0 8 0	0 0 1	0 13 1	3 Cows.	2 0 0	0 0 0	0 2 0	0 0 8	0	0 8 0	0 1 0	..	..	0 1 0	0 0 4	0 5 0	..	0 2 0	0 0 0	3 3 15	3 9 1 9	Ditto.
	Noor Mahomed,....	M	Servant.	1	5	0	2 8 0	0 2 0	0 0 0	0 0 0	2 10 0	..	1 0 0	0 0 0	0 0 1	0 0 6	0	0 2 0	0 2 0	..	..	0 4 0	0 0 8	0 2 6	..	0 0 0	0 0 0	2 9 0	0 1 0	Ditto.
	Fakir Mahomed,....	M.	Ryot.	1	0	3	6 0 0	0 0 4	0 0 0	0 1 0	7 4 0	6 Cows	2 0 0	0 0 0	0 0 4	0 0 2	0	0 4 0	0 2 0	..	0 8 0	0 2 0	0 0 4	0 4 0	..	0 0 6	0 0 8	1 8 6	2 11 6	Ditto.
50	Ramdoss,.....	H.	Fisherman.	1	2	1	4 8 0	0 0 0	0 0 0	0 0 0	4 8 0	..	1 8 0	0 4 0	0 4 0	0 0 0	0	0 3 0	0 4 0	..	0 4 0	0 2 0	0 0 0	0 4 0	..	0 1 6	0 2 0	3 4 6	1 3 6	Ditto.
	Ramdhun, ...	H.	Shopkeeper.	0	0	2	6 0 0	0 0 0	0 0 0	0 0 0	6 0 0	.	1 0 0	0 0 0	0 2 0	0 4 0	.	0 1 0	0 4 0	..	0 6 0	0 0 8	0 0 0	0 4 0	..	0 1 0	0 2 0	3 0 0	3 0 0	Ditto.

* Balance against.

Table A.

Table exhibiting the monthly income and expenditure of 100 *Families in Zillah Chittagong, Bengal,* 1849. *In Rupees, Annas and Pie.*

	Name.	1 Caste.	2 Employment.	No. of Dependents. 3 Wives.	4 Children.	5 Brothers, &c.	Income per Month. 6 Husband. R. A. P.	7 Wife. R. A. P.	8 Other Members of family. R. A. P.	9 Monthly produce of Land R. A. P.	10 Total. R. A. P.	11 No. of livestock.	Monthly expenditure of whole Family. 12 Rice. R. A. P.	13 Dhal. R. A. P.	14 Salt. R. A. P.	15 Fish. R. A. P.	16 Meat. R. A. P.	17 Pepper and spices. R. A. P.	18 Vegetables R. A. P.	19 Milk R. A. P.	20 Fuel. R. A. P.	21 Tobacco. R. A. P.	22 Oil. R. A. P.	23 Clothing. R. A. P.	24 Schooling. R. A. P.	25 Rent of House. R. A. P.	26 Rent of Land. R. A. P.	27 Total. R. A. P.	28 Balance. R. A. P.	29 Is supply of salt sufficient?
	Abdoolgooney, ...	M.	Rope-maker	1	0	2	5 0 0	0 0 0	0 0 0	0 0 0	5 0 0	2 Cows.	2 8 0	0 1 0	0 3 0	0 12 0	..	0 5 6	0 8 0	..	..	0 2 6	0 4 0	0 7 0	..	0 0 0	0 0 0	5 2 6	*0 2 6	Yes.
	Rohomut ally.....	M.	Ryot.	1	4	0	3 0 0	0 8 0	0 0 12	0 0 0	4 4 0		1 8 0	0 2 0	0 4 0	0 6 0	..	0 3 0	0 2 0	..	..	0 2 0	0 2 0	0 8 0	..	0 1 0	0 0 9	3 6 9	0 13 3	Ditto.
	Magun ally, ...	M.	Servant.	0	0	5	1 0 0	0 0 0	0 3 5	0 0 0	1 0 0		0 4 0	0 3 0	0 2 0	0 2 0	..	0 4 0	0 3 0	..	..	0 1 6	0 2 0	0 4 0	..	0 0 3	0 0 3	3 5 0	1 4 0	Ditto.
	Cassim ally, ...	M.	Ryot.	2	4	0	4 0 0	0 2 0	0 0 0	0 10 6	4 12 6	5 Cows.	3 12 0	0 1 0	0 4 0	0 2 6	..	0 4 0	0 1 0	..	..	0 4 0	0 2 0	0 8 0	..	0 1 0	1 10 6	7 2 0	*2 5 6	Ditto.
5	Samud ally.....	M.	Ditto.	1	1	0	1 0 0	0 3 0	0 0 0	1 14 0	3 1 0	2 Cows.	1 0 0	0 0 0	0 3 0	0 1 0	..	0 3 0	0 4 0	..	..	0 1 0	0 0 6	0 4 0	..	0 0 6	1 0 0	3 1 0	0 0 0	Ditto.
	Wozir ally,.....	M.	Peon.	0	0	4	4 0 0	0 0 0	0 3 0	2 0 0	6 3 0	..	1 8 0	0 1 0	0 2 0	0 2 0	..	0 3 0	0 3 0	..	0 2 0	0 1 0	0 1 6	0 3 0	..	0 0 0	0 4 0	2 15 0	3 4 0	Ditto.
	Callo, ...	M.	Ryot.	1	3	5	3 0 0	0 5 0	0 0 11	0 0 0	4 0 0	4 Cows.	2 0 0	0 0 0	0 8 0	0 2 0	..	0 3 0	0 0 0	..	..	0 1 0	0 0 6	0 4 0	..	0 1 0	1 4 0	4 7 6	*0 7 6	Ditto.
	Kistomungul, ...	H.	Ditto.	1	2	1	3 8 0	0 0 0	0 0 0	1 8 6	5 0 6	..	2 0 0	0 1 6	0 4 0	0 4 0	..	0 3 6	0 0 0	..	0 2 0	0 1 0	0 1 6	0 7 0	..	0 0 6	0 12 0	0 4 4	0 12 0	Ditto.
	Tunnu, ...	M.	Cooly.	1	0	3	3 0 0	0 4 0	0 2 0	0 3 0	5 7 0	..	1 4 0	0 3 0	0 2 0	0 4 0	..	0 4 0	0 4 0	..	..	0 0 0	0 2 0	0 4 0	..	0 0 6	0 3 0	2 14 6	2 8 6	Ditto.
10	Meahjan.....	M.	Mangee.	1	0	0	3 0 0	0 4 0	0 0 0	0 4 0	3 8 0	12 Cows.	1 0 0	0 1 0	0 2 0	0 2 0	..	0 2 0	0 4 0	0 2 0	..	0 1 0	0 1 0	0 4 0	..	0 0 6	0 1 0	2 4 6	1 3 6	Ditto.
	Hyder ally, ...	M.	Cooly.	1	3	0	2 8 0	0 3 0	0 12 0	0 0 0	3 7 0	1 Cow.	1 8 0	0 0 0	0 2 0	0 2 0	..	0 2 0	0 2 0	..	..	0 1 0	0 1 0	0 3 0	..	0 0 6	0 0 6	2 11 6	0 11 6	Ditto.
	Dwan ally, ...	M.	Ditto.	1	2	1	4 0 0	1 2 0	0 0 6	0 0 2 6	5 10 6	..	1 8 0	0 0 0	0 2 0	0 8 0	..	0 2 0	0 8 0	..	..	0 3 0	0 1 0	0 3 0	..	0 0 6	1 0 0	4 3 6	1 7 0	Ditto.
	Azgur ally, ...	M.	Ditto.	1	1	1	1 0 0	0 4 0	0 3 0	1 3 6	1 10 6	..	1 0 0	0 0 0	0 1 0	0 1 0	..	0 1 0	0 1 0	..	..	0 0 0	0 0 0	0 2 0	..	0 0 6	0 12 0	2 2 6	*1 8 0	Ditto.
	Amud ally, ...	M.	Ryot.	1	0	2	2 0 0	0 0 0	0 4 0	0 0 0	6 0 0	2 Cows.	1 0 0	0 1 0	0 4 0	0 8 0	..	0 4 6	0 1 0	0 8 0	0 4 0	0 2 0	0 4 0	0 5 0	..	0 1 0	0 0 0	3 10 6	2 5 6	Ditto.
15	Ahamud ally.....	M.	Tindal.	1	0	3	8 0 0	0 0 0	0 0 0	8 0 0	..	..	1 0 0	0 0 0	0 2 0	0 1 0	..	0 3 0	0 2 0	0 1 0	..	0 2 0	0 2 0	0 6 0	..	0 0 6	0 1 3	3 3 9	4 12 3	Ditto.
	Mahomed Hossen,..	M.	Ryot.	2	2	1	4 0 0	1 0 0	0 0 0	0 0 9	5 0 9	3 Cows.	2 4 0	0 0 6	0 4 0	0 1 0	..	0 6 0	0 4 0	0 6 0	..	0 1 0	0 4 0	0 2 0	..	0 1 0	0 0 3	2 0 9	0 0 0	Ditto.
	Rohomut olla, ...	M.	Ditto.	1	0	7	7 0 0	0 8 0	0 0 0	0 0 0	7 8 0	..	3 0 0	0 0 0	0 2 0	0 2 0	..	0 10	0 4 6	..	..	0 2 0	0 4 0	0 5 0	..	0 1 0	0 9 0	5 7 0	3 1 0	Ditto.
	Suffer ally, ...	M.	Binsty.	0	0	1	2 8 0	0 0 0	0 8 0	0 0 0	3 0 0	..	1 0 0	0 2 0	0 1 0	0 2 6	..	0 1 0	0 4 0	..	0 4 0	0 2 0	0 2 0	0 4 0	..	0 0 6	0 0 6	2 7 6	0 8 6	Ditto.
	Abdool ally, ...	M.	Rope-maker	1	1	3	5 0 0	0 4 0	0 0 0	0 0 9	5 13 0	..	2 0 0	0 0 2	0 2 0	0 8 0	..	0 1 0	0 4 0	0 8 0	..	0 4 0	0 3 0	0 6 0	..	0 0 6	0 2 0	4 0 6	1 12 6	Ditto.
20	Teluck, ...	H.	Dobey.	1	0	2	5 0 0	0 0 0	0 4 0	0 0 0	9 0 6	..	2 0 0	0 0 0	0 2 0	1 14 0	..	0 2 0	0 8 0	..	1 0 0	0 8 0	0 8 0	0 2 0	..	0 1 0	0 1 3	7 6 3	1 9 9	Ditto.
	Woomed ally, ...	M.	Cooly.	1	0	0	1 8 0	0 2 0	0 0 0	0 6 0	2 0 0	2 Cows.	1 4 0	0 0 0	0 0 1	0 0 0	..	0 2 0	0 1 0	..	..	0 0 0	0 0 6	0 2 0	..	0 0 0	0 0 9	1 12 0	0 1 0	Ditto.
	Annu, ...	M.	Ryot.	1	3	6	2 0 0	0 0 0	0 2 0	0 0 0	2 0 0	1 Cows.	2 0 0	0 1 0	0 4 0	0 4 0	..	0 8 0	0 4 0	..	0 1 6	0 2 0	0 2 0	0 5 0	..	0 2 0	1 4 0	5 5 6	0 10 6	Ditto.
	Cally Duss,.....	H.	Bearer.	1	0	5	2 0 0	0 0 0	0 2 0	2 10 0	6 10 0	Buffalo.	1 0 0	0 0 0	0 4 0	0 4 0	..	0 4 0	0 8 0	..	..	0 2 0	0 2 0	0 4 0	..	0 1 1	0 2 6	0 5 3	0 1 7	Ditto.
	Sooker Mahomed, ..	M.	Chowkidar.	1	1	0	2 8 0	0 8 0	0 0 0	0 1 0	3 1 0	..	1 0 0	0 0 0	0 1 0	0 4 0	..	0 4 0	0 2 0	..	0 1 0	0 1 0	0 5 0	0 1 0	..	0 0 6	0 0 9	2 1 3	0 12 9	Ditto.
25	Tazu, ...	M.	Shopkeeper.	0	0	2	2 0 0	0 0 0	0 2 0	1 8 0	5 8 0	..	1 8 0	0 1 0	0 2 0	0 8 0	..	0 4 0	0 2 0	..	0 4 0	0 1 6	0 1 6	0 8 0	..	0 0 9	0 0 0	3 8 9	1 15 3	Ditto.
	Sookloll, ...	H.	Priest.	1	1	1	15 0 0	0 0 0	0 0 0	0 0 0	15 0 0	1 Cow.	2 0 0	0 0 4	0 0 2	0 1 0	0 1 0	0 1 0	0 4 0	..	0 8 0	0 8 0	0 8 0	1 4 0	..	0 1 0	0 0 0	0 6 10	0 8 6	Ditto.
	Acbur ally,.....	M.	Bricklayer.	1	2	3	3 0 0	0 8 0	0 0 0	0 0 0	3 8 0	..	1 8 0	0 0 0	0 0 1	0 0 2	..	0 1 6	0 1 0	..	..	0 0 9	0 1 0	0 3 0	..	0 0 0	0 1 0	2 3 3	1 4 3	Ditto.
	Nazam ally, ...	M.	Ryot.	0	0	3	3 0 0	0 0 0	0 1 0	0 10 0	4 10 0	2 Cows.	1 8 0	0 0 0	0 2 0	0 0 0	..	0 2 0	0 2 0	..	..	0 0 0	0 1 0	0 4 0	..	0 0 6	0 8 0	3 11 6	0 14 6	Ditto.
	Latuah, ...	M.	Servant.	0	0	1	2 0 0	0 0 0	0 1 6	0 0 0	3 6 0	..	1 4 0	0 0 0	0 0 0	0 2 0	..	0 1 6	0 2 0	..	..	0 1 0	0 1 0	0 1 0	..	0 0 0	0 0 0	2 0 6	1 5 6	Ditto.
30	Mudhunneah, ...	M.	Cooly.	0	0	1	1 0 0	0 0 0	1 0 0	0 0 0	3 0 0	..	1 0 0	0 0 0	0 2 0	0 1 0	..	0 1 0	0 2 0	..	..	0 1 0	0 1 0	0 1 0	..	0 0 3	0 0 8	0 2 1	0 14 9	Ditto.
	Hassenenk, ...	M.	Ditto.	1	3	0	3 0 0	0 2 0	0 0 0	0 0 0	3 2 0	..	1 0 0	0 0 0	0 0 1	0 0 4	..	0 1 6	0 4 0	..	..	0 0 9	0 1 0	0 4 0	..	0 1 0	0 0 0	0 2 1	1 0 3	Ditto.
	Samud ally,.....	M.	Shopkeeper.	1	0	0	4 0 0	0 0 0	0 0 0	0 0 0	4 0 0	..	1 0 0	0 0 1	0 0 1	0 0 1	..	0 7 0	0 2 0	..	0 2 0	0 2 0	0 8 0	0 8 0	..	0 2 0	0 0 0	0 3 6	0 9 6	Ditto.
	Hassan ally, ...	M.	Syce.	1	0	4	3 0 0	0 0 0	1 8 0	0 0 2	4 10 0	..	2 0 0	0 0 1	0 0 4	0 0 4	..	0 3 0	0 2 0	..	..	0 2 0	0 2 0	0 5 0	..	0 1 0	0 0 0	0 3 9	0 1 1	Ditto.
	Mahomed Cassim, ..	M.	Chowkidar.	1	1	2	3 8 0	0 0 4	0 0 0	0 0 6	4 2 9	..	2 0 0	0 0 1	0 0 2	0 0 6	..	0 1 3	0 4 0	..	0 3 0	0 2 0	0 4 0	0 4 6	..	0 1 0	0 0 6	0 6 4	0 14 9	Ditto.
35	Samud ally, ...	M.	Ryot.	1	4	7	4 0 0	0 0 0	1 0 0	0 0 8	5 8 0	3 Cows.	3 0 0	0 0 4	0 0 6	0 0 2	..	0 4 0	0 8 0	..	0 4 0	0 8 0	0 1 0	0 10 0	..	0 2 6	0 2 0	6 3 6	*0 11 6	Ditto.
	Hamza, ...	M.	Syce.	0	0	4	5 0 0	0 0 0	0 4 0	1 4 0	6 8 0	4 Cows.	1 12 0	0 0 4	0 0 2	0 0 4	..	0 2 0	0 3 0	..	.	0 2 0	0 5 0	0 12 0	..	0 1 3	0 9 0	4 8 3	1 15 9	Ditto.
	Chunder Sing,.....	H.	Burcundaz.	1	1	0	4 0 0	0 1 0	0 0 0	0 0 0	4 1 0	..	1 0 0	0 0 4	0 0 2	0 0 2	..	0 2 0	0 2 0	..	..	0 0 0	0 1 0	0 4 0	..	0 1 6	0 10 0	2 12 6	1 7 6	Ditto.
	Cally Doss,.....	H.	Cooly.	1	0	3	2 0 0	0 3 0	0 0 0	0 0 8	2 11 0	2 Cows.	2 0 0	0 0 0	0 0 3	0 0 0	..	0 2 0	0 2 0	..	..	0 1 0	0 2 0	0 4 6	..	0 0 6	0 4 0	3 3 0	*0 8 0	Ditto.
	Rundeano, ...	H.	Ditto.	0	0	4	2 0 0	0 0 0	0 4 0	0 0 0	6 2 0	..	1 8 0	0 0 0	0 4 0	0 3 0	..	0 4 0	0 2 0	..	..	0 0 9	0 1 0	0 4 0	..	0 0 9	0 1 6	2 13 6	3 4 6	Ditto.
40	Futtey ally, ...	M.	Ditto.	1	3	0	3 0 0	0 4 0	0 0 0	0 0 0	3 6 0	..	2 0 0	0 0 0	0 0 2	0 0 0	..	0 4 0	0 2 0	..	..	0 2 0	0 1 0	0 4 0	..	0 0 9	0 1 6	3 0 9	0 5 3	Ditto.
	Toofan ally, ...	M.	Servant.	1	4	0	3 0 0	0 0 0	0 0 0	0 0 0	3 0 0	..	1 4 0	0 0 1	0 0 2	0 2 0	..	0 4 0	0 1 0	..	..	0 1 0	0 1 0	0 6 0	..	0 2 0	0 2 0	2 10 6	0 11 0	Ditto.
	Muttey jan,.....	M.	Ryot.	0	0	5	4 0 0	0 0 0	0 3 11	0 0 0	7 11 0	2 Cows.	2 8 0	0 0 1	6 0 2	0 1 0	..	0 12 0	0 2 0	..	..	0 2 0	0 4 0	0 4 0	..	0 4 0	0 0 0	3 5 7	2 3 3	Ditto.
	Hassen beck, ...	M.	Servant.	1	0	0	3 0 0	0 0 0	0 0 0	0 0 0	3 0 0	..	1 0 0	0 0 4	0 0 2	0 0 0	..	0 9 0	0 4 0	..	..	0 0 0	0 4 0	0 2 0	..	0 2 0	0 0 0	0 3 11	0 4 3	No.
	Amzut ally,.....	M.	Ditto.	1	1	6	3 0 0	0 12 0	0 4 0	0 0 0	4 0 0	1 Cow.	1 10 0	0 0 0	0 0 2	6 0 4	0	0 6 0	0 4 0	..	0 1 0	0 2 0	0 6 0	0 12 0	..	0 4 0	0 1 0	0 4 4	3 11 6	Yes.
45	Assud, ...	M.	Ryot.	1	1	1	3 0 0	0 5 0	0 0 0	0 1 11	5 3 0	3 Cows	1 8 0	0 0 0	0 0 4	0 0 0	..	0 6 0	0 2 0	..	..	0 5 0	0 2 0	0 5 0	..	0 1 0	0 0 9	0 3 10	0 1 9	Ditto.
	Wally, ...	M.	Burkundaz.	1	0	5	2 12 0	0 0 0	1 8 0	0 0 4	4 8 0	..	2 0 0	0 0 0	0 0 2	0 0 0	..	0 2 0	0 0 0	..	..	0 1 0	0 4 0	0 5 0	..	0 2 0	0 0 1	0 1 9	3 5 3	1 2 9	Ditto.
	Abdool ally, ...	M.	Boatman.	0	0	3	5 0 0	0 0 0	0 8 0	0 0 1	0 13 1	3 Cows.	2 0 0	0 0 0	0 0 2	0 0 8	..	0 8 0	0 1 0	..	..	0 1 0	0 4 0	0 5 0	..	0 2 0	0 0 0	3 15 3	9 1 9	Ditto.
	Noor Mahomed,....	M.	Servant.	1	5	0	2 8 0	0 2 0	0 0 0	0 0 0	2 10 0	..	1 0 0	0 0 0	0 0 1	0 0 6	..	0 2 0	0 2 0	..	..	0 4 0	0 8 0	0 2 0	..	0 0 0	0 0 0	2 9 0	0 1 0	Ditto.
	Fakir Mahomed,....	M.	Ryot.	1	0	3	6 0 0	0 1 0	0 0 0	0 1 0	7 4 0	6 Cows	2 0 0	0 0 0	0 0 4	0 0 2	..	0 4 0	0 4 0	..	0 8 0	0 2 0	0 4 0	0 4 0	..	0 0 6	0 0 8	4 8 6	2 11 6	Ditto.
50	Ramdoss,.....	H.	Fisherman.	1	2	1	4 4 8	0 0 0	0 0 0	0 0 0	4 8 0	..	1 8 0	0 0 4	0 0 4	0 0 0	..	0 3 0	0 4 0	..	0 4 0	0 2 0	0 0 0	0 4 0	..	0 1 6	0 2 0	3 1 6	1 3 6	Ditto.
	Ramdhun, ...	H.	Shopkeeper.	0	0	2	6 0 0	0 0 0	0 0 0	0 0 0	6 0 0	..	1 0 0	0 0 0	0 0 2	0 0 4	..	0 1 0	0 4 0	..	0 6 0	0 0 8	0 0 0	0 4 0	..	0 1 0	0 2 0	3 0 0	3 0 0	Ditto

* Balance against.

The absence of all entry under the head of "schooling" (column 24,) would not imply the entire absence of education, as such may have been paid for in kind. Column 28 exhibits the balance for, or against. When the latter occurs, it is shewn by asterisks, but, according to the Table, this unfavourable condition only existed in eight cases out of the hundred.

The sums contained in this Balance Column, however, it must be remembered are still chargeable with the heavy demands consequent upon pujas, Marriage and Burial ceremonies, as well as the possible interest of debts. It is to be regretted that I did not ascertain the current outlay due to the latter. Putting debt aside, however, which ought to form but an unimportant item in a healthy state of society, the foregoing Table offers a favourable view of the resources, and adaptations of income to expenditure in a native of Bengal.

Having thus endeavoured to determine the average income and expenditure of one hundred families, who may be regarded as types of the great mass of the inhabitants of Bengal, it became a point of interest to ascertain the actual quantity and quality of food consumed daily by the same class. No opportunity for effecting this inquiry occurred during my subsequent stay at Chittagong. As soon as I became sufficiently acquainted with Rajeshye, however, I put it in operation. Forms of inquiry regarding the separate daily consumption of food of twenty men were accordingly placed in the hands of six Darogahs attached to the same number of separate Thannahs of Rajeshye. These were accompanied by full instructions to the effect that twenty inhabitants of the nearest village should be individually and separately questioned as to the amount and kind of food daily consumed by each. On my receipt of these detailed tables the Totals for every five men were tabulated as below, and from their total again the mean quantity was computed. The fact of six returns, made by as many separate inquiries, differing so little from each other in mean results, and approximating so closely to the table formed by myself, on which I bestowed considerable care, gives them a claim to reliability which in the absence of such checks they would have failed to possess.

Table B.

Shewing the average quantity of Food consumed daily by four Classes of Adult men in Zillah Rajshahye, in the Month of March, 1852. *N. B. In kutcha weight, seers, chittacks and kachas.*

1	2	Total quantity and kind of food consumed daily by Hindoo Ryots.																											
No. of men subjected to inquiry.	Names of Thannas and Ghatees at which inquiry was made.	3 Rice.			4 Dhal.			5 Salt.			6 Fish.			7 Meat.			8 Spice.			9 Vegetable.			10 Milk.			11 Oil.			12 Total.		
		s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k	s.	c.	k.	s.	c.	k.	s.	c.	k	s	c.	k.
5	Baulcah, ...	5	6	0	1	5	0	0	5	1	0	0	0	0	0	0	0	1	1	1	2	0	0	0	0	0	4	2	0	0	0
5	Tanore, ...	5	0	0	1	4	0	0	2	2	0	0	0	0	0	0	0	2	2	1	4	0	0	0	0	0	3	3	0	0	0
5	Bhobaneegunge, ...	4	11	0	1	2	0	0	1	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	2	0	0	0
5	Godagary, ...	5	0	0	1	4	0	0	2	2	0	0	0	0	0	0	0	1	1	0	12	0	0	0	0	0	2	2	0	0	0
5	Ghatee Surda, ...	6	14	0	1	4	0	0	5	0	0	0	0	0	0	0	0	1	1	0	10	0	0	0	0	0	5	0	0	0	0
5	Do. Pooteah, ...	6	0	0	1	4	2	0	4	0	0	0	0	0	0	0	0	1	0	1	6	2	0	0	0	0	2	0	0	0	0
	Total,..	32	15	0	7	7	2	1	4	1	0	0	0	0	0	0	0	8	1	7	2	2	0	0	0	1	2	1	0	0	0
	Daily means for each man, ...	1	1	2	0	4	0	0	0	2	0	1	0	0	0	0	0	0	1	0	3	3	0	1	0	0	0	2	1	12	2

Table C.

1	2	Total quantity and kind of food consumed daily by Moosulman Ryots.																											
		3			4			5			6			7			8			9			10			11			12		
No. of men subjected to inquiry.	Names of Thannas and Ghatees at which inquiry was made.	Rice.			Dhal.			Salt.			Fish.			Meat.			Spice.			Vegetable.			Milk.			Oil.			Total.		
		s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.
5	Bauleah, ...	5	6	0	1	4	0	0	5	0	0	0	0	0	0	0	0	1	1	1	2	0	0	0	0	0	4	2	0	0	0
5	Tanore, ...	6	0	0	0	15	0	0	3	3	0	0	0	0	0	0	0	1	1	1	4	0	0	0	0	0	5	0	0	0	0
5	Bhobaneegunge, ...	4	11	0	1	2	0	0	1	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	2	0	0	0
5	Godagary, ...	5	0	0	1	2	0	0	2	2	0	0	0	0	0	0	0	1	1	0	10	0	0	0	0	0	2	2	0	0	0
5	Ghatee Surda, ...	7	8	0	1	4	0	0	5	0	0	0	0	0	0	0	0	1	1	0	6	0	0	0	0	0	5	0	0	0	0
5	Do. Pooteah, ...	5	13	0	1	4	1	0	3	3	0	0	0	0	0	0	0	2	1	1	5	3	0	0	0	0	2	2	0	0	0
	Total,..	34	6	0	6	15	1	1	5	0	0	0	0	0	0	0	0	8	1	6	11	3	0	0	0	1	4	0	0	0	0
	Daily means for each man, ...	1	2	1	0	3	2	0	0	2	0	1	0	0	0	2	0	0	1	0	3	2	0	1	0	0	0	2	1	13	0

Table D.

1	2	Total quantity and kind of food consumed daily by Hindoo Coolies.																							
		3			4			5			6			7			8			9			10			11			12		
No. of men subjected to inquiry.	Names of Thannas and Ghatees at which inquiry was made.	Rice			Dhal.			Salt.			Fish.			Meat.			Spice.			Vegetable.			Milk.			Oil.			Total.		
		s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k	s.	c.	k.	s.	c.	k	s.	c.	k.	s.	c.	k.	s.	c.	k	s.	c.	k.
5	Bauleah, ...	5	6	0	1	2	0	0	5	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	4	3	0	0	0
5	Tanore, ...	5	0	0	1	4	0	0	2	2	0	0	0	0	0	0	0	2	2	1	4	0	0	0	0	0	3	3	0	0	0
5	Bhobaneegunge, ...	5	0	0	2	0	0	0	5	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	3	0	0	0
5	Godagary, ...	5	0	0	1	4	0	0	2	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	2	0	0	0
5	Ghatee Surda, ...	6	14	0	1	4	0	0	5	0	0	0	0	0	0	0	0	1	1	0	10	0	0	0	0	0	5	0	0	0	0
5	Do. Pooteah, ...	5	11	0	1	2	2	0	3	2	0	*	0	0	*	0	0	4	0	1	5	2	0	*	0	0	2	1	0	0	0
	Total,..	32	15	0	8	0	2	1	7	2	0	0	0	0	0	0	0	10	0	7	3	2	0	0	0	1	3	0	0	0	0
	Daily means for each man, ...	1	1	2	0	4	1	0	0	3	0	1	0	0	0	0	0	0	1	0	3	3	0	1	0	0	0	2	1	13	0

Table E.

1	2	Moosulman Coolies.																											
		4			4			5			6			7			8			9			10			11			12		
No. of men subjected to inquiry.	Names of Thannas and Ghatees at which inquiry was made.	Rice.			Dhal.			Salt.			Fish.			Meat.			Spice.			Vegetable.			Milk.			Oil.			Total.		
		s.	c.	k.	s.	c.	k	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k	s.	c.	k.	s.	c.	k.	s.	c.	k.
5	Bauleah, ...	5	6	0	1	5	0	0	5	0	0	0	0	0	0	0	0	1	1	1	2	0	0	0	0	0	5	0	0	0	0
5	Tanore, ...	5	0	0	0	10	0	0	2	2	0	0	0	0	0	0	0	1	1	0	10	0	0	0	0	0	2	2	0	0	0
5	Bhobaneegunge, ...	5	0	0	2	0	0	0	5	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	3	0	0	0
5	Godagary, ...	5	4	0	1	3	0	0	2	2	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	2	2	0	0	0
5	Ghatee Surda, ...	7	8	0	1	4	0	0	5	1	0	0	0	0	0	0	0	1	1	0	10	0	0	0	0	0	5	0	0	0	0
5	Do. Pooteah, ...	5	9	0	0	15	1	0	3	0	0	*	0	0	*	0	0	3	2	1	5	0	0	*	0	0	2	1	0	0	0
	Total,....	33	11	0	7	5	1	1	7	1	0	0	0	0	0	0	0	8	1	6	5	0	0	0	0	1	2	0	0	0	0
	Daily means for each man.	1	2	0	0	3	3	0	0	3	0	1	0	0	0	2	0		1	0	3	1	0	1	0	0	0	2	1	13	0

* The mean quantities of Fish, Meat and Milk are derived from statements accompanying the detailed Tables. In calculating "Totals" and "means" small fractions are omitted. Columns 6, 7 and 10 are left unfilled in consequence of the articles of food therein referred to, being consumed only occasionally, and their insertion in a Table shewing daily consumption thus becomes difficult. The note appended to the Table will however shew how the means have been obtained. The Meat generally consumed by the Moosulmans in this zillah, is Cow-beef.

I am not disposed to place any great faith in the statistical accuracy of the Darogahs, but the fact of the totals from separate Thannahs of the district, between the officers of which no intercommunication on the subject is at all likely to have taken place, exhibiting no great discrepancy, is intrinsic evidence in favour of the average arrived at, being a fair exposition of the daily food of the people.

With the view of correcting any inaccuracy, however, which might arise from careless inquiry, I personally instituted a similar one amongst twenty men in the Sudder Sation, which I give in detail in the following Tables.

TABLE F.

Shewing the average quantity of food consumed daily by 20 Moosulman Coolies in Rampore Bauleah, March, 1852.

N. B. In kutcha weight. Coolies working in private Compound.

1	3		4		5		6		7		8		9		10		11		12	
Number.	Rice.		Dhal.		Salt.		Fish.		Meat.		Spice.		Vegetable.		Milk.		Oil.		Total.	
	s.	c. k.	s.	c. k.	s.	c. k	s.	c. k.	s.	c. k	s.	c. k.	s.	c. k.	s.	c. k	s.	c. k.	s.	c. k.
1	1	0 0	0	4 0	0	0 2	0	4 0	0	4 0	0	0 2	0	2 0	0	8 0	0	1 0	0	0 0
2	1	0 0	0	4 0	0	1 0	0	2 0	0	2 0	0	1 0	0	4 0	0	8 0	0	0 2	0	0 0
3	1	4 0	0	4 0	0	0 2	0	4 2	0	8 0	0	1 0	0	1 0	0	0 0	0	1 0	0	0 0
4	1	0	0	4 0	0	0 2	0	4 0	0	4 0	0	1 0	0	1 0	0	8 0	0	1 0	0	0 0
5	1	0 0	0	2 0	0	0 2	0	1 0	0	2 0	0	0 2	0	2 0	0	0 0	0	0 2	0	0 0
6	1	0 0	0	4 0	0	0 3	0	4 0	0	4 0	0	0 0	0	4 0	0	0 0	0	0 2	0	0 0
7	1	0 0	0	8 0	0	1 2	0	4 0	0	4 0	0	1 0	0	4 0	0	8 0	0	1 0	0	0 0
8	1	0 0	0	4 0	0	0 3	0	4 0	0	4 0	0	0 1	0	4 0	0	8 0	0	0 2	0	0 0
9	1	0 0	0	4 0	0	0 3	0	4 0	0	4 0	0	1 0	0	1 0	0	4 0	0	1 0	0	0 0
10	1	0 0	0	2 0	0	0 2	0	2 0	0	2 0	0	0 1	0	2 0	0	4 0	0	0 2	0	0 0
Total.	10	4 0	0	0 0	0	7 1	0	0 0	0	0 0	0	6 2	0	0 0	0	0 0	0	7 2	0	0 0
Daily means.	1	1 0	0	1 0	0	0 3	0	1 0	0	0 3	0	0 3	0	1 2	0	1 0	0	0 3	1	7 0

Table G.

Coolies Working in Silk Filature.

1 Number.	3 Rice.			4 Dhal.			5 Salt.			6 Fish.			7 Meat.			8 Spice.			9 Vegetable.			10 Milk.			11 Oil.			12 Total.		
	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.
1	0	0	0	0	2	0	0	0	2	0	4	0	0	2	0	0	0	½	0	2	0	0	1	0	0	1	1	0	0	0
2	1	0	0	0	2	0	0	0	2½	0	4	0	0	4	0	0	0	2	0	2	0	0	0	0	0	0	2	0	0	0
3	1	0	0	0	4	0	0	0	2	0	3	0	0	0	0	0	1	0	0	2	0	0	8	0	0	1	0	0	0	0
4	1	0	0	0	2	0	0	0	1	0	2	0	0	4	0	0	0	2	0	2	0	0	8	0	0	0	2	0	0	0
5	0	12	0	0	2	0	0	0	2	0	1	0	0	0	0	0	0	2	0	1	2	0	2	0	0	0	2	0	0	0
6	1	0	0	0	4	0	0	0	2	0	1	2	0	3	0	0	0	1	0	1	0	0	8	0	0	0	2	0	0	0
7	1	0	0	0	2	0	0	0	1	0	2	0	0	3	0	0	2	0	0	2	0	0	8	0	0	0	2	0	0	0
8	0	12	0	0	2	0	0	0	½	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	2	0	0	0
9	1	0	0	0	4	0	0	0	1	0	2	0	0	0	0	0	2	0	0	2	0	0	8	0	0	0	1	0	0	0
10	0	10	0	0	2	0	0	0	1	0	1	0	0	0	0	0	0	1	0	1	0	0	4	0	0	0	2	0	0	0
Total.	8	12	0	1	10	0	0	3	3	0	0	0	0	0	0	0	7	½	1	0	2	0	0	0	0	6	0	0	0	0
Daily means.	0	14	0	0	2	2	0	0	1	0	1	0	0	2	0	0	0	3	0	1	3	0	1	0	0	0	2	1	6	1

In Columns 4, 6, 7, 9, 10, of Tables F. and G. the quantities noted were only consumed at varying intervals and from a calculation based on these, the mean has been computed.

Owing to the steady demand for labour in the silk filatures in, and around, Rampore Bauleah, the standard of wages is high. It is probable therefore that the results above shewn, exhibit the maximum of food consumed by the labouring population of Bengal. By comparing the two sets of tables, it will be seen that the mean daily quantity indicated by the 4 tables containing the results of the Darogahs' inquiries exceeds that obtained by my own. The former amounts to 1 seer, 12 chittaks, and 3 kachas, kutcha weight, which is equivalent to 1 seer, 5 chittaks, and 2 kachas pucka weight, or about 43 oz. English, whilst the latter is 1 seer, 6 chittaks, 2 kachas, kutcha, equivalent to 1 seer, 3 kachas pucka weight, or about 34 oz. English.

With the view of testing what quantity a man could possibly consume at one time, I directed five coolies working in my compound to obtain whatever they pleased for the morning meal. The supply was brought and carefully weighed in my presence, before and after cooking, with the following results, and was subsequently eaten before me.

Table H.

Shewing the quantity of Food consumed at their morning meal by five Moosulman Coolies, April 3d, 1852, in kutcha weight seers, chattaks and kachas.

Articles.	Weight before Cooking			Weight after Cooking.			Price.		
	s.	c.	k.	s.	c.	k.	r	a.	p.
Rice,	3	2	0	10	2	0	0	1	3
Dhall,	0	8	0	2	12	0	0	0	3
Salt,	0	3	0	0	3	0	0	0	3
Fish,	0	3	0	0	0	0	0	0	6
Vegetables,	0	6	0	1	7	0	0	0	3
Spice,	0	2	2	0	2	2	0	0	1½
Oil,	0	2	1	0	2	1	0	0	3
Dhye,	1	0	0	1	0	0	0	0	6
Total,	5	10	3	15	12	3	0	3	4½
Evening meal said to be ⅔ of above,	3	14	0	0	0	0	0	2	8
Grand Total,	9	8	3	0	0	0	0	6	½
Mean,	1	15	0	0	0	0	0	1	2½

Taking the mean of all the above Tables then, it may thus be pretty safely admitted, that the adult male population of Rájshahye consumes about 1 seer, 3 chittaks of food per man per day, which amounts in English weight to about 38 oz.

Comparing the quantity with that consumed in England, it will be seen that the Bengal peasant of this district and time, labours under no comparative disadvantage.

In the Report of the Commissioners for inquiring into the administration and operation of the Poor Laws (1834) Mr. Chadwick gives the following statement of the average consumption of solid food per week by different classes.

An independent labourer, ...	122	oz. per week.
A soldier, ...	168	„ „ „
An able-bodied pauper, ...	151	„ „ „

Now taking the mean of the above Tables, we get a daily allowance of 1 seer, 3 chittaks, or about 266 oz. per week, for the Rajeshye peasant *

So much for the quantity, but taking quality also into our consideration it will again be found in a perusal of the following extract from Mr. Senior's "Statement of the provision for the poor, and of the condition of the labouring classes in a considerable portion of America and Europe," that the Bengal peasant stands in a very favourable position in that respect also.

"Quantity of food used by an agricultural labourer having a wife and four children."

"*America, New York.*—Tea, coffee, meat, twice a-day. *Massachusetts.*—Poultry, meat, or fish, twice or thrice a-day.

"*Mexico.*—Maize, prepared either in porridge or thin cakes, and beans, with chilly a hot pepper, of which they eat large quantities as seasoning.

"*Carthagena de Columbia.*—Chiefly animal food.

"*Venezuela.*—Maize, vegetables, and fruit.

"*Uruguay.*—Animal food.

* This excess in quantity over the English diet roll is of course due to the want of concentration of the nutritive elements.

"*Hayti.*—Plantains, sweet-potatoes, and other vegetables.

"*Norway.*—Herrings, oatmeal porridge, potatoes, coarse oatmeal bread, bacon and salt-beef perhaps twice a week, fish on the sea and river. Brandy in general use.

"*Sweden.*—In the south, potatoes and salt fish; in the north, porridge and rye bread.

"*Russia* (general return).—Rye-bread, buck-wheat, and sour cabbage, soup seasoned with salt and lard.

"*Denmark, Copenhagen.*—Rye-bread, inferior coffee, cheese and butter.

"*Elsinore.*—Rye-bread, groats, potatoes, coffee, butter, cheese and milk.

"*Hanseatic Towns, Lubeck.*—Rye-bread and potatoes, bacon seldom, peas-porridge, groats, cheap fish.

"*Bremen.*—Potatoes, beans, buck-wheat, groats, rye-bread, meat about twice a-week.

"*Mecklenburg.*—Good sound food, occasionally meat.

"*Danzig.*—Chiefly rye-bread and potatoes, meat once or twice weekly.

"*Würtemberg.*—Soup, potatoes, bread, meat once or twice a-week.

"*Frankfort.*—Soup, potatoes, vegetables, bread, coffee, and beer daily, meat on one or two days.

"*Holland* (general return).—Rye-bread, cheese, potatoes, vegetables, beans and pork, butter-milk, buck-wheat, meal, &c.

"*Belgium, Boom.*—Bread, potatoes, and milk.

"*Ostend.*—Potatoes and bread in the towns; in the country a little butter, vegetables, and sometimes a piece of pork.

"*Goesbek.*—Rye-bread, cheese, butter or fat bacon, vegetables, coffee, and weak beer.

"*France. Hâvre.*—Bread, vegetables, cider, very rarely animal food; coffee and treacle are also used.

"*Brittany.*—Buck-wheat, barley-bread, potatoes, cabbages, and about 6lbs of pork weekly.

"*La Loire Inferieure.*—Bread and vegetables, bacon or other meat now and then.

"*Bordeaux.*—Rye-bread, millet-soup, Indian-corn, sometimes salt provisions, butchers' meat very rarely.

"*Marseilles.*—Vegetables, bread, farinaceous substances made into soup, meat-soup or bouillie probably once a-week.

"*Piedmont.*—No meat, little wine, twice as much maize as wheat-flour.

"*Portugal.*—Salt-fish, vegetable-soup, with oil or lard, maize-bread.

"*The Azores.*—Maize-bread, vegetables, potatoes, and fruit, meat seldom, fish when abundant.

"*Greece; Patras.*—Maize or wheaten bread, olives, pulse, vegetables, salt-fish, meat occasionally.

"*European Turkey.*—Bread, rice, greens, dried beans and peas, olives and onions, meat about once a-week.

"*Malta* (from a communication).—Barley-bread, cheese, carob, or other beans, and soup of maize or millet with herbs, when in employ, when out of employ, a little bread and soup only."

With the view of estimating the relation between the consumption of food, and the necessary outlay, it seems desirable to add the following Table shewing the average Bazar prices for each kind of food during the year of observation in Rájshahye.

Table I.

Table Shewing the Bazar rate per Sicca Maund of Articles of Food in Rampoor Bauleah, for each Month of 1852. *In Rupees, Annas, Gundas.*

Names of the Months.	Rice.	Dall.	Vegetable.	Fish.	Salt.	Oil.	Tobacco.	Mussala.	Wood.
	Rs. As. G.	Rs. As. G.	Rs. As. G.	Rs. As. G.	Rs. As. G.	Rs. As. G.	Rs. As. G.	Rs. As. G.	Rs. As. G.
January,	0 15 10	1 9 0	0 4 12	4 9 13	4 0 0	5 5 6¾	2 8 0	2 3 16	0 2 0
February,	0 15 8	1 8 11¾	0 4 12	5 2 10	4 0 0	5 0 6½	2 8 0	2 5 0	0 2 0
March,	1 0 4¼	1 9 2¼	0 4 11½	3 13 18¾	4 0 0	5 0 6¾	2 8 0	2 6 0	0 2 0
April,	0 15 17½	1 3 19	0 4 13¾	4 6 7	4 0 0	5 0 6½	2 8 0	2 5 6¾	0 2 0
May,	1 0 3¼	1 3 19	0 5 13¼	4 4 14	4 0 0	5 14 0	2 8 0	2 1 7½	0 2 0
June,	1 13 1¾	1 4 0	0 9 0	4 4 0	4 0 0	5 7 17	2 8 0	1 12 2	0 2 0
July,	1 1 0	1 4 0	0 7 2	4 3 13	4 0 0	5 8 16	2 8 0	1 13 8	0 2 0
August,	1 1 14½	1 3 19	0 7 2	6 1 0	4 0 0	5 6 15	2 8 0	1 9 3¼	0 2 0
September,	1 2 18¾	1 6 2¾	0 5 13¼	6 0 0	4 0 0	5 6 14¾	2 8 0	1 6 0	0 2 0
October,	1 6 10	1 7 5	0 4 7	6 13 0	4 0 0	5 6 18¾	2 8 0	1 8 8	0 2 0
November,	1 2 0	1 6 6	0 5 13	4 13 10	4 0 0	5 9 6	2 8 0	1 14 13	0 2 0
December,	1 4 0	1 7 5	0 2 16½	4 4 0	4 0 0	5 14 15	2 8 0	1 12 0	0 2 0
Average of the year,	1 1 14	1 16 2¼	0 5 8	4 14 7	4 0 0	5 6 15¾	2 8 0	1 14 15¼	0 2 0

Sufficiency of Food and Income in excess of necessary expenditure constitute two important elements of the Public weal, and these would certainly appear to have been in existence in the portion of Bengal from which my observations are derived. That many and various social evils yet exist cannot be doubted, but want of means to procure a sufficiency of food for the retention of life and health would not appear to be one of them, except in special famine years, and so far Bengal may be considered to exhibit as small an average deficiency of the comforts of life, as any modern nation.

Literary Intelligence.

In a preface to the Catalogue des Manuscrits et Xylographes Orientaux contained in the Imperial Public Library of St. Petersburgh, a copy of which was lately presented to our Society by the Directors of that Institution, the compiler has sketched the progress of the collection, the foundation of which was laid after the capture of Warsaw by the Russians, in 1795. The celebrated Zalusky Library was then carried to St. Petersburgh, and to this nucleus was added, in 1805, a number of MSS. collected by Doubrowsky, an employé in the foreign office who had made the most, apparently, of the opportunities which fell in his way during the revolutionary wars, and had gathered a "riche moisson" which he subsequently presented to the Emperor Alexander. In 1813, however, the Oriental Department of this Institution could only produce 183 MSS. The bulk of the present collection is formed of the spoils of Turkey and Persia. The Ardébil Mosque containing the Sséfy Mausoleum and mentioned by Morier, furnished 166 vols. to the Russian General Suchtelen in 1828, and the Ahmed Mosque of Akhaltisk, containing 148 Turkish and Arabic works, gave up its Library to Paskévitch in 1829.

The present collection consists of the following MSS.

Arabic, ...	247	Georgian, ...	15	Pali, ...	4
Persian, ...	255	Mantchoo, ...	35	Goojeratee, ...	1
Turkish, ...	100	Chinese, ...151		Hindee, ...	1
Hebrew, ...	6	Mongol,.....	5	Bengali,.....	1
Ethiopian, ...	9	Calmuc, ...	1	Malayalam, ...	1
Syriac,.....	5	Tibetan,.....	10	Tamul, ...	10
Coptic, ...	8	Japanese, ...	14	Siamese, ...	1
Armenian, ...	11	Sanskrit, ...	8	Javanese, ...	1

As was to be expected its riches consist mainly in Arabic, Persian and Turkish works. The Chinese department too obtained some valuable acquisitions from Kamensky when at the head of the Russian Mission which visited Pekin in 1823. In Indian MSS. the Library is lamentably poor, the solitary specimen being in one or two cases the publication of some Mission Press.

The Catalogue is in French, and of a raisonné character. The typography is most creditable to the Press maintained at the Imperial Academy of Sciences. Not more than 300 copies have been

printed, the work being intended only for distribution among Scientific Institutions and eminent orientalists. The descriptions of the Turkish, Arabic and Persian MSS. which compose the bulk of the volume are by Dorn; they are very complete, embracing the notices given of the Ardébil and Akhaltisk MSS. by Frähn in 1829 and 1830. The Indian MSS. were all taken to London for examination, and the notices of these are by a young German Doctor, Reinhold Rost.

The Qurán alsa'dayn, a Dilly periodical in Hindustany, announces the publication at Dilly, of the first volume of a Persian Dictionary which has the title مصطحات بهارعجم; it comprizes 817 pages of 28 lines. The author of this important work is *Ték* Chand, whose takhalluç was Bahár—a Khatry of Dilly. He flourished in the second half of the last century, after he had completed the first copy of his work, continued his lexicographical labours and made numerous additions and improvements, and found himself compelled to write out a second copy, but even here his lexicographical researches did not stop. He made successively seven copies or editions of his work, of which the last is of course the most perfect. At the time of his death the autograph of the seventh edition was in the hands of one of his pupils, whose name is Inderman, and he made an abridgment of it, and it is this abridgment which is now generally known in India as the Baháre 'ajam, and is considered the best Persian Dictionary that exists. Yet it is only the shadow of the work of which now the first volume has been published. *Ték* Chand had critically studied the whole Persian literature, and had travelled in Persia in order to make himself fully master of the Persian language and its dialects. The spoken language of Persia is simple enough, and so are some of their prose writers. To understand these writers, or the 'urf of the language, almost any dictionary is sufficient, but in their great poets there occur many verses which are perfectly unintelligible, and though the copies of their works agree generally very well, you find almost in every copy a different reading. We have very few ancient commentaries on Persian poets (the only very valuable books on this subject are the جواهر الاسرار by Adzory, and Abú-l-*H*asan's commentary on Anwary, few other commentaries known in India have much critical value), and it is therefore only

by very extensive and critical reading that these difficulties can be cleared up. They consist, sometimes in allusions which have become hackneyed among poets, like نعل در آتش; sometimes in the use of rare and obsolete words, and sometimes in the use of strange idioms. All doubt on these subjects can only be removed when we have critical editions of the principal Persian authors; in the mean time however the Bahár Dictionary is, by far, the most valuable book of reference on these points, because, as the term مصطلحات in the title implies, it is expressly designed to meet these difficulties, and his immense reading and intercourse with the most learned Persian scholars both in India and Persia, enabled him to collect and make bear on the difficulties a number of passages from classical Persian authors. For a European lexicographer this Dictionary will not only be valuable in furnishing him with explanations which he finds nowhere else, but, what is much more valuable, it enables him to strike out many absurd meanings, which are given to words in Richardson and even in the Burháne Qátí, and which rest on misunderstood passages of poets.

Very few Sanskríta works have appeared since we last had occasion to advert to the publications of the native press of Calcutta. Paṇdita Ánanda Chandra Vedántavágísa of the Tattwabodhiní Society has lately published some of the standard works of the Vedánta system of philosophy, and among them we find excellent editions in the Bengali character of the *Vedántasára* of Sadánanda, with the commentaries of Nrisiñha Saraswati and Rámatírtha Yati, and of the *Panchadasi*, or the Fifteen Chapters on the Principles of the Vedánta, by Vidyáraṇya, with the commentary of Rámakrishṇa. The learned Paṇdita is now engaged in carrying through the press, the *Adhikaranamálá of* Bhárati Tirtha with a commentary: the work is to appear in monthly parts, and seven fasciculi have been already published.

The new edition of the Raghu Vañsa, which was adverted to some time ago, has just issued from the Sanskrita Press of Calcutta.

Of Bengali works we have to record,

1. বাহ্য-বস্তুর সহিত মানব-প্রকৃতির সম্বন্ধ-বিচার; or the Relation of the Mind to external objects. By Bábu Akshayakumára Datta. Tattwabodhiní Press, 1852-3, 2 vols. 12mo. Besides two original essays, these volumes include a reprint of a series of papers published under

the above title in the Tattwabodhiní Patriká, the organ of the Calcutta Vedántists. The author has taken Combe's *Constitution of Man* for his guide, and most ably advocated the opinions of those who maintain that the best food of man is derived from the vegetable kingdom. The style of writing is remarkably pure and elegant, and affords an excellent instance of the facility with which Sanskrita vocables may be introduced into Bengáli to the utter exclusion of all foreign elements, which constitute so material a portion of the Indian vernaculars.

2. Lamb's Tales of Shakespeare, translated into Bengáli by Bábu Udayachandra Ádya, Purnachandrodaya Press, 1853, 1 vol. 8vo. Another version of these tales is, we are informed, now in the press, and will, ere long, be published by the Vernacular Literature Committee.

3. Bhaktamála or the Garland of the Faithful, being a resumé of the works of Nábháji, Náráyana Dása and Krishna Dása. 1853, 8vo. The work includes notices of nearly three hundred Vaishnava saints, and abounds in a variety of insipid and extravagant legends. "It exercises," says Professor Wilson, "a powerful influence in Upper India on popular belief, and holds a similar place in the superstitions of this country, as that which was occupied in the dark ages of the Roman Catholic faith by the Golden Legend and Acts of the Saints."

4. Macaulay's Life of Lord Clive, translated into Bengáli by Bábu Harachandra Datta, and published by the Vernacular Literature Committee, Calcutta, 1852, 8vo. This work has been very well received by the Hindu community, and, it is said, a second edition will be published immediately.

5. An Essay on the Sanskrit language and literature; by Pandit Isvarachandra Vidyáságara, read at a meeting of the Bethune Society on the 13th of April, 1853.—Sanskrita Press, 1853.

As a writer the Pandit has a happy facility in expressing his meaning with perspicuity in the simplest and most polished language. Clearness, indeed, is the leading character of his composition, which is a fair specimen of the best prose of the Bengal vernacular. His remarks on the Sanskrita poets are generally very judicious.

The Essay is a laudable attempt to raise the Bengáli to be an instrument of literary criticism—a task of which the writer more than once owns the difficulty.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL,

FOR MAY, 1853.

The Society met on the 4th instant at the usual hour.

SIR JAMES COLVILE, Knight, President, in the Chair.

The proceedings of the last monthly meeting were read and confirmed.

The presentation, by Lieut. A. Robertson, of a large slab of stone closely inscribed on both faces with Páli characters, found in a heap of rubbish on the upper terrace of the Great Pagoda at Rangoon, was announced.

The following gentlemen, duly proposed and seconded at the last meeting, were balloted for, and elected ordinary members.

C. W. Cunliffe, Esq., C. S.

D. Grant, Esq., C. S.

Shah Kabir-uddeen.

The following gentlemen were named for ballot at the next meeting.

Rev. K. M. Banerjya,—proposed by the Rev. W. Kay and seconded by the President.

W. S. Halsey, Esq., C. S.,—proposed by Mr. Grote and seconded by the President.

The Council submitted a report, requesting the sanction of the Society to an outlay of a sum not exceeding Rs. 1,500 for repairs of, and additions to, the Society's premises.

The recommendation, on being put to the meeting, was adopted unanimously.

Read Letters—

1st. From Mr. Blyth, enclosing the first part of a paper, by Dr. Jerdon, on the Reptiles of Southern India.

2nd. From Dr. Fayrer, Rangoon, forwarding Meteorological Registers, from that place, for the months of November, December and January last.

3rd. From W. Muir, Esq., Secretary to the Government N. W. Provinces, enclosing a Meteorological Register kept at the Secretariat Office, Agra, for the month of March, 1853.

4th. From S. Bowring, Esq., sending two copies of an inscription from Pehewa near Thaneswur.

5th. From C. Allen, Esq., Officiating Secretary to the Government of India, forwarding a Geological Map of the Salt Range prepared by Dr. Fleming.

6th. From W. G. Young, Esq., Officiating Under-Secretary to the Government of Bengal, communicating a report, by the Commissioners of Assam, on the deposits of gold sand on the Banks of the Jugloo River, in Assam.

7th. From W. Elliott, Esq., Vizagapatam, communicating three lists of Canarese and Telegu works published at the Telegu Press of Vizagapatam, the Tamul Press of the Propaganda at Pondicherry and the Presses of the German Mission on the Malabar Coast.

The Curator in the Zoological Department and the Librarian submitted reports of additions made to their Departments in course of the last month.

Read and confirmed, *June 1st*, 1853.

(Signed) J. W. Colvile.

Report of Curator, Zoological Department.

Sir,—In the present Report, I have found it convenient to combine several unpublished Reports, and thus to notice under single headings the various successive donations for which we are indebted to Capt. Sherwill, Capt. Berdmore, Dr. Kelaart and others.

1. Capt. W. S. Sherwill. An extensive collection of sundries from Darjiling, consisting of skins of mammalia and birds, and numerous entire specimens of small mammalia, birds, and reptiles, taken out of spirit and transmitted in closed tins; an excellent mode of forwarding moist specimens to great distances, which originated with Capt. Thos. Hutton of Masuri: also some interesting species of land-shells.

Of mammalia, are sent entire specimens of HIPPOSIDEROS ARMIGER, Hodgson (distinct from H. NOBILIS), RHINOLOPHUS PEARSONII, Horsfield,* LASIURUS PEARSONII, Horsf., SCOTOPHILUS FULIGINOSUS, Hodgson, PLECOTUS AURITUS ? (in bad condition), and skin of RHINOLOPHUS PERNIGER (LUCTUS ?)—SOREX NEMORIVAGUS, Hodgson (found also in Sylhet and Arakan), and CORSIRA NIGRESCENS, Gray (v. *Sorex soccatus*, Hodgson),—NEODON SIKIMMENSIS, Hodgson, and a MUS affined to M. FLAVESCENS, and another which seems to accord with M. DUBIUS, Hodgson.

The only bird new to the museum is YUHINA NIGRIMENTA, Hodgson (a fine pair); and there is also a much finer specimen than we possessed previously of ALCEDO EURYZONA, Temminck (of which species *A. grandis*, nobis, from Darjiling, represents the adult, and *A. nigricans*, nobis, from Malacca, appears to be merely the young). An example of PARUS RUBIDIVENTRIS, nobis, occurs, confirming that species, of which we had previously seen but one specimen. Capt. Sherwill has also favoured us with a fine skeleton of NEOPHRON PERCNOPTERUS.

Of reptiles, he has sent CALOTES TRICARINATUS, *n. s.* (young), MOCOA SIKIMMENSIS, *n. s.*,—CALAMARIA FUSCA, *n. s.*, C. TENUICEPS, *n. s.*, COLUBER RADIATUS, C. KORROS, C. FASCIOLATUS,—C. NIGROMARGINATUS, *n. s.*,—DIPSAS MACRODON, *n. s.*, D. SHERWILLII, *n. s.*, DRYINUS NASUTUS, TROPIDONOTUS GRACILIS, *n. s.*, BUNGARUS CANDIDUS, VIPERA (?) SIKIM-

* Very distinct from RH. TRAGATUS, Hodgson. To Dr. Horsfield's description of it may be added that the lower lip has but one medial groove; whereas in RH. TRAGATUS the lower lip is conspicuously divided by three grooves into two medial and two lateral lappets, the former more narrow and elongated than the latter. The same structure recurs in RH. AFFINIS, Horsfield *(apud nos)*, from Ceylon; the species which, in the Society's collection, most approximates RH. TRAGATUS in structure. RH. MITRATUS, nobis, appears to have but one groove on the lower lip, so far as can be judged from stuffed specimens the lips of which had been relaxed by moisture; and this species is well and strongly distinguished by the much greater comparative development of the raised nasal follicle, and also the much greater lateral expansion of the vertical projection above it.

MENSIS, *n. s.*,—MEGALOPHRYS GIGAS, *n. s.*, ("edible frog" of Sikim), BOMBINATOR SIKIMMENSIS, *n. s.*, and other species of anourous BATRACHIA.

Of fishes, one small Cyprin.

2. W. Theobald, Esq., Panjab Salt Range Survey, Pind Dádan Khan. Various small animals taken out of spirit, and sent down moist in a tin canister. Of Bats are sent RHINOPOMA HARDWICKEI, (Gray), upwards of 270 individuals of which species were caught in one day at a place called Bhera, near Pind Dádan Khan;—also DYSOPUS PLICATUS, (B. Ham.);—SCOTOPHILUS COROMANDELIANUS, (F. Cuv.); and

HIPPOSIDEROS CINERACEUS, nobis, *n. s.* Similar to H. MURINUS, (Elliot), in structure, but larger and of a different colour. The entire under-parts are greyish-white; and the basal three-fourths of the piles of the upper fur are the same, the terminal fourth being of a dusky grey, but shewing the whitish hue beneath, especially on the head and neck. Length of fore-arm $1\frac{3}{16}$ in.; of ear posteriorly $\frac{5}{8}$ in.

An apparently new Mouse may be designated

MUS GERBILLINUS, nobis. Entire length of male 5 in., of which the tail is $2\frac{7}{8}$ in. Tarsus with toes and claws, $\frac{3}{4}$ in.; ear-conch (anteally) barely $\frac{1}{2}$ in. Female rather smaller. Fur of mean length, of a sandy-brown colour on the upper-parts, white below and on the limbs, which latter have a faint tinge of the colour of the back. About twenty-five caudal vertebræ. Tail thinly clad with minute setæ.

Of reptiles, are sent—MONITOR DRACÆNA, juv.,—HEMIDACTYLUS COCTÆI,—GYMNODACTYLUS GECKOIDES, Spix *(Stenodactylus scaber*, Rüppell*), CHARASIA DORSALIS, Gray,—UROMASTYX HARDWICKEI, Gray,—and two specimens of CABRITA LESCHENAULTII, (D. and B.),—also VIPERA ECHIS, Ind. var., of which Mr. Theobald writes—"This Viper is very common here in rocky places under the hills. It and an almost hoodless Cobra are the only poisonous snakes I have seen. The Viper is rarely of any size, the largest examined measuring—body $10\frac{7}{8}$ in., tail $1\frac{1}{8}$ in. = 12 in. It was well gorged with a large grasshopper. Forced to bite a fowl on each leg, no effect became visible for fifteen or twenty minutes; after which a lethargy came on very gradually, and in an hour the fowl was unable to stand, but did not die till two hours after the bite. The fowl seemed to derive much benefit by being dashed with cold water. Among the Lizards, the most curious is the herbivorous one (UROMASTYX HARDWICKII). It is eaten up here, and is I believe esteemed as an aphro-

* Perhaps a distinct species, though very closely affined. It is of a greyish colour, spotted rather than banded above with blotches of a darker hue, variegated by some of the tubercles being of a whitish colour.

disiac. These Lizards make burrows in sandy and stony places to the depth of 2 ft. or more. There are always several in one place, like the burrows of Rabbits. They are not much out in the cold weather, but in the hot weather are seen roaming about near their burrows, morning and evening. They appear as the sun is getting up, and stay grazing near the holes till almost mid-day, and are out also in the evening. Towards dusk they retire, and carefully close the holes with sand, so that it is not easy to find them. They offer no resistance when caught."

3. From E. F. Kelaart, Esq., M. D., Ceylon Medical Service. A fine collection of Cinghalese reptiles chiefly, in spirit, comprising several species new to the Society's museum. The species now sent are EMYDA PUNCTATA (head and limbs of a large specimen),—MONITOR DRACÆNA, HYDROSAURUS SALVATOR,—HEMIDACTYLUS TRIEDRUS, H. PIERESII, Kelaart, H. COCTÆI, H. FRÆNATUS, BOLTALIA SUBLÆVIS, PIRIPIA PERONII, and GYMNODACTYLUS TIMORIENSIS? (*G. Kandianus*, Kelaart),—LYRIOCEPHALUS SCUTATUS, SALEA JERDONI (from Newera Elia), CALOTES ROUXI? (from do.; C. MYSTACEUS, agreeing with Burmese specimens, having before been sent from that locality), C. VERSICOLOR, C. OPHIOMACHUS (one example not differing from the others in structure, having a black-edged white streak extending on each side from the neck to the coloured part of the tail, on which latter it breaks into spots and disappears), SITANA PONTICERIANA,—TILIQUA RUFESCENS, RIOPA HARDWICKEI,—ARGYROPHIS BRAMINUS, UROPELTIS (apparently a new species, of which examples have been sent to the Chatham museum, where they will probably have been described by Dr. A. Smith),—CALAMARIA SCYTALE, XENODON PURPURASCENS, COLUBER KORROS, LEPTOPHIS ORNATUS—(var., of a clay-brown colour, the upper-parts marked throughout with a series of black transverse bands, the head marked as usual), DRYINUS NASUTUS, VIPERA RUSSELLII, TRIGONOCEPHALUS NIGROMARGINATUS (specimen $27\frac{1}{2}$ in. long, with the black markings much more developed than in Dr. Schlegel's figure),—ICTHYOPHIS GLUTINOSUS,—POLYPEDATES CRUCIGER, P. LEUCOMYSTAX, LYMNODYTES LIVIDUS, *n. s.*, L. MACULARIUS, *n. s.*, RANA LESCHENAULTII?, R. ROBUSTA, *n. s.*, PYXICEPHALUS FODIENS, Jerdon, ENGYSTOMA RUBRUM, Jerdon, and BUFO MELANOSTICTUS.

4. From Capt. Berdmore, Mergui. A large collection of sundries in spirit, and also various skins. The mammalia sent are GALÆOPITHECUS VOLANS, PTEROPUS JAVANICUS, CYNOPTERUS MARGINATUS, NYCTICEJUS TEMMINCKII, SCOTOPHILUS COROMANDELIANUS, FELIS BENGALENSIS, PARADOXURUS TYPUS, P. LEUCOTIS (vide Horsfield's *Catal.*), TUPAIA FERRU-

GINEA (var. *Belangeri*), SOREX SERPENTARIUS, SCIURUS CHRYSONOTUS (dark var.), MUS (vide XXI, 433*), and TRAGULUS KANCHIL.

Of the birds, the most worthy of notice are GECINUS DIMIDIATUS, LYNCORNIS CERVINICEPS, CORVUS SPLENDENS (unknown in Arakan, save of late years partially to the northward, and of the dark variety inhabiting also Ceylon), CALORNIS CANTOR (nec COLUMBINUS, v. *affinis*, nobis, of Arakan), MUNIA RUBRONIGER (having less black on the belly than in Bengal specimens, while some which we have seen from Penang want it altogether), PYCNONOTUS JOCOSUS (similar to Penang specimens, in which the crimson ear-tuft is constantly shorter and of a more intense crimson than in Indian specimens, and this bird is unknown in Arakan), CARPOPHAGA BICOLOR, ARGUS GIGANTEUS, ARDEA SUMATRANA (*A. rectirostris*, Gould),† and CASARCA LEUCOPTERA, nobis.

Of reptiles, skins of EMPAGUSIA FLAVESCENS and HYDROSAURUS SALVATOR; and examples in spirit of GECKO VERUS (triple-tailed), BOLTALIA SUBLÆVIS, PIRIPIA PERONII, and LEIURUS BEDDMOREI, *n. s.*,—DRACO MACULATUS, ACANTHOSAURA ARMATA, CALOTES EMMA,—ASPRIS BEDDMOREI, *n. s.*, RIOPA ALBOPUNCTATA,—XENOPELTIS UNICOLOR, PYTHON RETICULATUS, LYCODON AULICUS, LEPTOPHIS PICTUS, L. ORNATUS, L. RUFESCENS (*Dipsas rufescens*, Gray, Hardw. *Ill. Ind. Zool.*) COLUBER RADIATUS, C. FASCIOLATUS, TROPIDONOTUS UMBRATUS (2 var.), TR. STOLATUS, TR. ZEBRINUS, *n. s.*, HOMOLOPSIS PLUMBEA, BUNGARUS FASCIATUS, B. CANDIDUS, NAIA TRIPUDIENS,—POLYPEDATES LEUCOMYSTAX, LYMNODYTES ERYTHRÆUS (Schl.), RANA ASSIMILIS (XXI, 355), R. (young of several species), ENGYSTOMA (affined to E. MALABARICUM, Jerdon), HYLÆDACTY-

* In a male sent, the lower parts are white as in M. FLAVESCENS, in a female brown, like the upper parts.

† Upon examination of a fine collection of Australian birds from the Port Philip district, and comparing certain of them with specimens in the Society's museum, we found that OREOCINCLA LUNULATA, (Lath.), seems to be identical with *O. nilgiriensis*, nobis, of the mountains of S. India (No. 930 of catalogue); though Gould's figures of it are more like the Asiatic O. DAUMA, (Lath., v. *Whitei*, Eyton). A single Australian male of *Synoicus chinensis* is considerably deeper-coloured than any Indian or Malayan example examined, with the black markings more developed on the back, and scarcely a trace of rufous on the wings; but this would seem to be merely an individual variety. Of two SITTELLÆ, otherwise similar, one has the crown and cheeks fuscous, with pale supercilia, the other has the entire head dull white with faint dark striæ. They seem to be varieties merely of S. CHRYSOPTERA, and Gould's S. LEUCOCEPHALA from Pt. Essington and Morton Bay respectively are probably but analogous varieties.

LUS (affined to H. MONTANUS, Jerdon), and BUFO MELANOSTICTUS (?), var.?—having the skin much less warty than usual, especially on the sides of the body and under-parts generally, which last are throughout speckled with black.

Likewise a small Goby (PERIOPTHALMUS); a crustacean affined to HOMARUS; specimens of a THELPHEUSA Crab, imbedded in hard desiccated mud (as if fossilized); and many sundries.

CALOTES EMMA, Gray. Affined to ACANTHOSAURA, Gray, not only by the pit anterior to the shoulder being more strongly developed than in C. MYSTACEUS and C. ROUXI, and black internally, as in AC. ARMATA, but by the greater elevation of the orbit, which however is less than in ACANTHOSAURA, though it bears a similar spine posteriorly. The scales, however, are those of typical CALOTES, but less obliquely disposed; and they are but very slightly keeled. A series of spines above the tympanum, each having one longer than the rest, and that of the anterior series longest, exceeding the orbital spine. A nuchal crest of moderately elevated spines, but the back is simply keeled. Longest hind-toe reaching to the eye. Length 13 in., of which the tail measures $8\frac{1}{2}$ in. Colour brown, variegated with darker brown and with pale brown. A black line passes through the eye to the ear, commencing a little behind the nostrils, and there are four black orbital rays above and two below it. Sides of the face speckled with black, and the head and throat are more or less suffused with ruddy, indicative of the male sex in breeding condition.*

* This species agrees so well in structure with Mr. Gray's description, that there can be little hesitation in identifying it. He states it, however, to be from Afghanistan, as also two other new species, his C. MINOR and C. MARIA, both of which latter he gives from Afghanistan *and* the Khásya hills. Now the late Dr. Griffith collected extensively in both regions, and transmitted all his specimens to the India House; and we find that those described by Mr. Gray were presented to the British Museum by the Hon'ble E. I. Company. It therefore follows, as *extremely probable*, that Dr. Griffith's Afghan and Khásya specimens had become mixed and confused; whilst it is most improbable that the same species should inhabit both the Khásyas and Afghanistan and not be observed elsewhere, and it is equally improbable that so many as four species of the tropical genus CALOTES (besides also the affined SALEA HORSFIELDI, Gray,) should inhabit Afghanistan, the common C. VERSICOLOR being also noted from thence by Mr. Gray. Again, the affinities of the Burmese C. EMMA here described are with the Burmese and Cinghalese C. MYSTACEUS and C. ROUXI, and with the Burmese and Malayan ACANTHOSAURA; and these Burmese forms and species may well extend up to the Khásyas, but are most unlikely to occur in Afghanistan. C. MARIA has also the

5. From Capt. T. Sparkes, Ramri. The two *rami* of the lower jaw of the Whale (or Rorqual, Balænoptera), which was stranded last year upon Juggoo or Amherst Island, (S. of Ramri island,) as noticed in XXI. 359; but they prove to be larger by one-half than Capt. Sparkes had supposed, measuring 21 ft. in length, minus an inch or two. This magnificent specimen is now fixed up in the museum, as experience has shown that such bones cannot, in this country, be permanently exposed to the weather with impunity.* The length of the left radius of this Rorqual measures 37 in.; the body of a sacral vertebra is 15 in. deep, by 16 in. broad, and nearly 14 in. in extreme length. A lumbar vertebra is somewhat smaller, with spinal apophyses measuring 27 in.; expanse of lateral apophyses, from tip to tip, 40 in.; and extreme height of the tip of the dorsal apophysis from the ground, 37 or 38 in.

6. From Mr. W. W. Nicholls, Sarawak. The nearly perfect skeleton of an adult wild Orang-utan, of the peculiar species indicated by Sir J. Brooke by the name *Mias Pappan*. In a memoir founded upon this and other specimens, the existence of four distinct specific types of the genus Orang-utan is rendered extremely probable, if not absolutely proved; and our museum contains adult female skeletons of three of these species, and skulls of adults of both sexes of the fourth species.

7. Dr. Fayrer, attached to the Hospital Staff, Rangoon. Several specimens of a Bat, Taphozous longimanus, (Hardwicke), the only two adult males having a strong rufous tinge. Also an example of Sciurus lokroides, Hodgson, var., with no decided rufous tinge on the back. Of birds, Athene cuculoides, (Vigors), and some others of common occurrence. Of reptiles, Gecko verus,—Calotes mystaceus,—C. versicolor,—and Bungarus fasciatus.

8. From Lieut. Hitchison, I. N., of the 'Mozuffer' S. V. Three small specimens of a Water Snake, of the supposed variety of Homolopsis leucobalia described by Dr. Cantor, and which is *Hipsirina Hardwickii*, Gray, of Hardwicke's 'Illustrations.'

9. Walter Elliot, Esq., Madras C. S. Two skins of Hystrix hirsutirostris, Brandt (*H. leucura*, Sykes), from Vizagapatam; obligingly sent for comparison with examples from other parts of the country.

shoulder-pit but not the orbital spine, and C. minor the orbital spine but not the shoulder pit, which are combined in C. emma; while the pit before the shoulder occurs in C. mystaceus and C. Rouxi of Burma and Ceylon, and also in two species of S. India obtained by Mr. Jerdon.

* A varnish might, however, be tried with probable advantage.

10. Mr. E. Wellend, of the Sailor's Home. A fine specimen of the 'Wattle-bird' of N. Zealand, CALLŒAS CINEREA, (Forster).

11. Capt. R. Tytler, 38th Light Infantry. Some bird-skins from Dacca, including perhaps a new CISTICOLA, not uncommon in that vicinity;* also MALACOPTERON ABBOTTI, nobis, there far from rare, though previously known only from the Burmese provinces. Capt. Tytler remarks that SCIURUS PALMARUM, so extremely common about Calcutta, is replaced at Dacca by Sc. LOKROIDES, Hodgson (a skin of which is sent); and among the common birds, MEGALAIMA LINEATA similarly replaces M. ASIATICA, and MICROPTERNUS PHAIOCEPS replaces BRACHYPTERNUS AURANTIUS, &c. The skin of a Pelican shot near Dacca, is that of the true P. ONOCROTALUS, L., of which we never before saw an Indian specimen. A Hare supposed by Capt. Tytler, to be distinct, appears to be the common LEPUS RUFICAUDATUS of all Lower Bengal; but L. HISPIDUS he described to be also there not uncommon.

12. H. W. Bennet, Esq. The body of a young *Ursus malayanus*.

13. C. Chapman, Esq., C. S. Skin of a melanoid CERVUS AXIS, L., procured in Mymunseng. General colour very dark brown, paler below, and nigrescent along the spine; the ordinary spots barely traceable. In this phase of colouring, the species illustrates the *Cervus nudipalpebra*. Ogilby, P. Z. S. 1831, p. 136; founded on a specimen in the museum of the Zoological Society.

14. A. Campbell, Esq., Darjiling. Skin of a female CERVUS WALLICHII, in addition to the male presented on a former occasion;† and also two skins of a small Jackal-like animal from Tibet, the VULPES FERRILATUS, Hodgson.

* Quite distinct from the common C. CURSITANS, (Franklin,) an example of which also is sent in breeding phase of plumage, wherein the pale lateral margins to the coronal feathers have all but disappeared, leaving the crown streakless blackish-brown: but it closely approximates C. ERYTHROCEPHALA, Jerdon, nobis, *J. A. S.* XX., 523, from which it differs in having the crown, breast and flanks, and lower tail-coverts, of a subdued white or dull yellowish-white faintly tinged with rufous, instead of being deep ferruginous,—and there is no rufous tinge on the upper-parts except very faintly on the rump and upper tail-coverts. In both the tail is much less deeply graduated than in C. CURSITANS, and of a dusky or blackish hue, with only an exceedingly slight pale edge at tip. Of several specimens procured, all were quite similar.

† Here may be mentioned, that we have just seen a superb pair of *Wapiti* antlers, which much exceed in size the finest yet obtained of those of the *Shou*, and have the crowns further subdivided.

15. From Raja Radakhant Deb. A Shark taken in the river.

16. Mr. Andrew DeCruz. A fresh specimen of VIVERRICULA MALACCENSIS.

17 Thos. Briden, of the 'Rose of Sharon' merchant vessel. Skeletons of two species of Albatross.

18. O. Toogood, Esq., C. S. A dead Turtle, CHELONIA VIRGATA.

19. A. Grote, Esq., Joint Secretary of the Society. Two skins of CORYDON SUMATRANUS.

20. Babu Rajendra Mállika. Dead specimens of a S. African Monkey (CERCOPITHECUS PYGERYTHRUS); and of a Lark, from middle Asia, MELANOCORYPHA CALANDRA (*M. torquata*, nobis, *passim*).

21. F. Skipwith, Esq., C. S. Four skins of HIPPOSIDEROS LARVATUS, —one of NYCTICEJUS LUTEUS, a hill specimen of TALPA LEUCURA,—two skins of TURTUR ORIENTALIS,—and, in spirit, a young TROPIDONOTUS, ARGYROPHIS BRAMINUS, specimens of POLYPEDATES LEUCOMYSTAX, var., and of RHICOPHORUS REINWARDTII (?), D. and B., or a closely affined species.

22. B. Heritage, Esq. Skin of DIOMEDEA EXULANS.

23. J. Payter, Esq. An albinoid specimen of MUS FLAVESCENS.

24. Alex. Mitchell, Esq. A collection of British specimens in various classes. Among the skins of mammalia and birds, a few may be selected for our museum, but we were previously well supplied with all the species sent. The same remark applies to the reptiles in spirit, consisting of a Viper and some Newts. Of British fishes in spirit, Mr. A. Kerr has contributed three specimens of CALLYONYMUS LYRA, three of MURÆNOIDES GUTTATA; and from the Montrose museum, we have received a specimen of RANICEPS TRIFURCATUS, and one of AMMODYTES TOBIANUS. Also skins of COTTUS BUBALIS, ASPIDOPHORUS EUROPŒUS, SALMO TRUTTA, two of S. FARIO, AMMODYTES LANCEA, and a fine skin of the Sun-fish, ORTHOGORISCUS MOLA,—the whole of which are exceedingly acceptable. Mr. Mitchell has further enriched our museum with a fine collection of British shells, comprising several species which we did not previously possess; and with 109 species of insects named, collected in the county of Forfarshire. Also with two large specimens of the remarkable northern crab, LITHODES ARCTICA.

25. From T. C. Jerdon, Esq., Mhow. A collection of reptiles and small fresh-water fishes from S. India; also a skin of MALACOCERCUS SOMERVILLEI, Sykes (verus). The reptiles are LYCODON AULICUS, XENODON PURPURASCENS, COLUBER PICTUS (Russell. I, pl. 29*), HERPETODRYAS MA-

* A true COLUBER, not LYCODON BALIODERA, as suggested by Dr. Cantor.

LABARICUS, Jerdon, *n. s.*, and NAIA TRIPUDIENS. The fishes have not yet been minutely examined.

E. BLYTH.

April 29th, 1853.

LIBRARY.

The following books have been added to the Library since the last meeting.

Presented.

Selections from the Records of the Government of India. No. 1, Papers on the proposed Railway in Bengal. Calcutta 1853, 8vo.—BY THE GOVERNMENT OF INDIA.

Report of the Inspector of Prisons, on the Management of the Jails from 1845 to 1851. Agra 1852, foolscap folio.—BY THE GOVERNMENT OF THE NORTH WESTERN PROVINCES.

Transactions of the Royal Irish Academy, for the year 1851-52, Vol. XXII. Pl. III.—IV.—BY THE ACADEMY.

Proceedings of ditto, Vol. V. Pl. II.—BY THE SAME.

Selections from the Public Correspondence of the Board of Administration for the affairs of the Punjab. No. 3, Lahore 1853. Royal 8vo. (4 copies).—BY THE BOARD.

Transactions of the Meteorological Society of Mauritius. Mauritius 1853, 8vo. Pamphlet.—BY THE SOCIETY.

Notes on the Winding and Dying Branches of the Silk Trade of Kurrachi. By Lieut. Stewart. Lahore 1853. Folio Pamphlet.—BY THE AGRICULTURAL and HORTICULTURAL SOCIETY OF THE PUNJAB.

Memorandum on the State of the Silk Trade and Manufacture of Peshawar. By Capt. H. James. Pamphlet.—BY THE SAME.

Bye-Laws of the Agri-Horticultural Society of the Punjab, (2 copies).—BY THE SAME.

Quarterly Journal of the Geological Society, No. 33.—BY THE SOCIETY.

Journal Asiatique 5m. serie, No. I.—BY THE SOCIE'TE' ASIATIQUE.

The Sixteenth Report of the Calcutta School Book Society.—BY BA'BU RA'JENDRALA'L MITTRA.

Zeitschrift der Deutschen morgenländischen Gesellschaft. VII. Band I. heft.—BY THE SOCIETY.

The Missionary, for March and April, 1853.—BY THE EDITOR.

Calcutta Christian Observer, for May, 1853.—BY THE EDITORS.

Journal of the Indian Archipelago, for November and December, 1852. 2 copies each.—BY THE GOVERNMENT OF BENGAL.

A Sheet Almanack in Bengali for the Bengali year 1260. By Bábu Nilakamala Basáka.—By the Author.

Upadeshaka, No. 77.—By the Editor.

The Oriental Baptist, No. 77.—By the Editor.

The Citizen newspaper for April last.—By the Editor.

The Indian Charter, No. for April.—By the Editor.

Bibidhártha Sangraha, No. 16.—By the Editor.

Tattwabodhiní Patriká, No. 115.—By the Tattwabodhiní Sabha'.

Purnachandrodaya for April 1853.—By the Editor.

Jahrbucher der Literatur, Nos. 3, 27, 37, 38, 39, 40, 77 and 79.—By the Baron von Hammer-Purgstall.

Exchanged.

The Calcutta Review, No. 37.

The Athenæum for January and February, 1853.

Purchased.

Comptes Rendus, No. 1 to 7, for 1853.

Annals and Magazines of Natural History for March 1853, two copies.

Edinburgh Review, No. 197.

Phillip's Introduction to the Sontal Language.

Gutzlaff's Life of Taou Kwang. 2 Vols.

Ra'jendrala'l Mittra.

May 4th, 1853.

For June, 1853.

The Society met on the 1st instant, at half-past 8 p. m.

Sir James Colvile, Kt., President, in the Chair.

The minutes of the last month's proceedings were read and confirmed.

The following presents were received:

1st. From E. Thomas, Esq. Copies of his papers on ancient Indian coins, to complete the series in the Society's Library.

2nd. From W. G. Young, Esq., Officiating Under-Secretary to the Government of Bengal. Lieut. Baird Smith's Work on Italian Irrigation.

3rd. From Capt. Harris. Two Mummies brought from Egypt, and also five small Turkish copper coins found in the cases of the

Mummies. The thanks of the Society were voted to Capt. Harris, which were conveyed to him by the President.

The following gentlemen duly proposed and seconded at the last meeting, were balloted for, and elected ordinary members.

Professor K. M. Banerjya.

W. C. Halsey, Esq., C. S.

W. J. Herschel, Esq., C. S., was proposed by Capt. Thuillier, as a candidate for election at the next meeting, seconded by the Rev. W. Kay.

The Philological Committee having recommended the acceptance of Dr. Sprenger's offer to edit the Biographical Dictionary of Ascalany, which has the title ﻋﺒﻘﺎﺕ of Capt. Hayes's offer to edit an Arabic work on Ethics, called "*Tiharat ul Nafs*," and of Mr. Hall's offer to edit the Sanskrita text of *Vásavadatta*, the Council requested the sanction of the meeting to their acting on that recommendation.

Ordered that the recommendation of the Philological Committee be adopted.

Read Letters—

1st. From W. G. Young, Esq., Officiating Under-Secretary to the Government of Bengal, transmitting copies of correspondence regarding discovery of Coal near the Chawa Nuddee, a tributary of the Teesta. This is the correspondence, extracts from which are embodied in the report of the Curator of the Museum of Economic Geology, read at the April meeting.

2nd. From Lieut. G. Pearce, Assistant Commissioner, Hazara, forwarding, for the Society's inspection, a drawing by the Rev. Anand Messiah, Senior, of a Hindu Astronomical Instrument called the "Jantra Raj," or King of all Astronomical Instruments.

3rd. From H. Piddington, Esq., a Twenty-Second Memoir on the Law of Storms.

4th. From E. Blyth, Esq., a paper entitled Notices and Description of various Reptiles—new or little known.

The Librarian submitted his usual monthly report.

Read and confirmed, *July 6th*, 1853.

(Signed) J. W. Colvile.

LIBRARY.

The following additions have been made to the Library since the last meeting.

Presented.

Italian Irrigation, being a report on the Agricultural Canals of Piedmont and Lombardy. By R. Baird Smith, Edinburgh, 1852. 2 vols. 8vo. with a folio volume of plates.—BY THE GOVERNMENT OF INDIA.

Journal of the Bombay Branch of the Royal Asiatic Society, No. XVII. —BY THE SOCIETY.

An Essay on the Arabic language. رساله در فضیلت عربیت بر زبان عجمیه 8vo. pamphlet.—BY SYAD KERAMAT ALI.

The Epoch of the Shah Kings of Shaurástra. By E. Thomas, Esq. London 1848.—BY THE AUTHOR.

On the Coins of the Hindu Kings of Cabul.—BY THE SAME.

On the Coins of the Kings of Ghazni.—BY THE SAME.

Supplement to the series of the Patán Kings of Hindustan.—BY THE SAME.

Notes on Col. Stacey's Ghazni Coins.—BY THE SAME.

A Remarkable Indo-Sassanian Coin.—BY THE SAME.

On Arsacidan and Partho Persian Coins.—BY THE SAME.

Tattwabodhiní Patriká, No. 118.—BY THE TATTWABODHINI' SOCIETY.

Calcutta Christian Observer, for June, 1853.—BY THE EDITORS.

The Oriental Baptist, No. 78.—BY THE EDITOR.

The Oriental Christian Spectator, Nos. for March and April, 1853.—BY THE EDITOR.

Upadeshak, No. 78.—BY THE EDITOR.

The Missionary, for June, 1853.—BY THE EDITOR.

The Bibidhártha Sangraha, No. 17.—BY THE EDITOR.

Purchased.

The Edinburgh Review, No. 198.

The Annals and Magazine of Natural History, for April, 1853.

Exchanged.

Journal of the Agri-Hortieultural Society of India. Vol. VIII. part 3.

RA'JENDRALA'L MITTRA.

June 1*st*, 1853.

Abstract of the Meteorological Register for January, 1853.

Rangoon, 1st February, 1853.

	Thermometer Sunrise.			Thermometer 9 A. M.			Thermometer Noon.			Thermometer 3 P. M.			Thermometer Sunset.			Thermometer 9 P. M.			Remarks.
	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	
Wet....	67	59	63.24	72	65	67 71	78	68	71.34	75	68	71.64	72	69	70	76	63	68.95	Rain showers on the 23rd, 24th and 26th.
Dry....	69	62	66.11	79	68	74	92	81	85.02	92	84	88.33	82	75	78.75	79	67.5	74.5	Mornings in the early parts of the month Foggy.
	Barometer Sunrise.			Barometer 9 A. M.			Barometer Noon.			Barometer 3 P. M.			Barometer Sunset.			Barometer 9 P. M.			Prevailing winds from N. E. occasionally N. W.
	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	
No instruments.																			Weather generally fine and clear.
	Of 17 observations.			Of 15 observations.			Of 25 observations.			Of 21 observations.			Of 8 observations.			Of 11 observations.			

J. Fayrer, M. D. *Asst. Surg. Field Hospital, Rangoon.*

Meteorological Observations for the month of January, 1853.

Date.	Sunrise.					9 a. m.					Noon.				
	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.
	Wet.	Dry.				Wet.	Dry.				Wet.	Dry.			
1	..	..	..	....	....	65	70	..	N. W. lt.	Clear.	70	81	,,	N b. E. lt.	Cum.-cir.
2	..	..	..	....	....	..	..	..	....	....	72	82	,,	Ditto.	Ditto.
3	64.5	69	..	N. W. lt.	Hazy.	72	68	..	N. W. lt.	Clear.	72	83	,,	Ditto.	Cumuli.
4	65	67	..	Ditto.	Ditto.	69	73	..	Ditto.	Ditto.	72	86	,,	N. W. stdy.	Cir.-cuml.
5	64.5	65.5	..	Calm.	Dense fog.	..	..	..	Ditto.	....	73	85	,,	Ditto lt.	Cumuli.
6	60	62	..	....	Hazy.	..	..	..	Ditto.	....	67	81	,,	Ditto f.	Clear.
7	59	62	..	Calm.	Ditto.	..	..	..	Ditto.	....	69	86	,,	Ditto lt.	Ditto.
8	60	64	..	Ditto.	Ditto.	65	75	..	Ditto.	Clear.	..	..	,,	.. ..	....
9	60	63	..	Ditto.	Calm.	67	78	..	Ditto.	Ditto.	67	86	,,	N. W. lt.	Clear.
10	..	..	..	....	....	..	..	..	....	....	69	85	,,	Ditto.	Ditto.
11	65	62	..	Calm.	Hazy.	..	..	..	....	....	70	88	,,	Ditto.	Ditto.
12	65	68	..	Ditto.	Ditto.	..	..	..	....	....	..	..	,,	....	....
13	63	65	..	Ditto.	Ditto.	..	..	..	....	....	72	87	,,	N. W. lt.	Cumuli.
14	..	..	..	....	....	67	72	..	N. W.	Clear.	72	90	,,	Ditto.	Ditto.
15	65	70	..	N. W.	Cloudy.	..	78	..	....	....	..	..	,,	....	....
16	67	67	..	....	....	68	73	..	N. W.	Cir.-cuml	71	86	,,	N. W. lt.	Cumuli.
17	..	..	..	....	....	70	78	..	....	....	73	87.5	,,	Ditto.	Ditto.
18	..	..	..	....	....	71	75	..	N. W.	Cirri.	73	90	,,	Ditto.	Ditto.
19	65	68	..	N. E.	Cir.-cum.	..	..	..	....	....	74	87	,,	Ditto.	Ditto.
20	..	..	..	....	....	..	..	..	....	....	72	85	,,	Ditto.	Ditto.
21	64	66	..	N. E.	Hazy,	..	..	..	....	....	73	79	,,	Ditto.	Ditto.
22	..	..	..	....	....	69	79	..	N. W.	Cirri.	72	86	,,	Ditto.	Ditto.
23	..	..	..	....	....	..	..	..	....	....	..	..	,,	....	....
24	62	67	..	N. E. f.	Cumuli.	67	76	..	N. E. f.	Clear.	68	77	,,	N. W. f.	Cloudy.
25	62	64	..	N. W. lt.	Cir.-strati.	65	68	..	N. E. lt.	Ditto.	68	75	,,	Ditto.	Ditto.
26	64	65	..	N. do.	Cumuli.	67	75	..	Ditto.	Ditto.	73	87	,,	Ditto.	Ditto.
27	..	..	..	....	....	66	72	..	Ditto.	Ditto.	..	..	,,	....	....
28	..	..	..	....	....	..	..	..	....	....	..	..	..	....	....
29	..	..	..	....	....	..	..	..	....	....	78	92	,,	N. W. lt.	Cumuli.
30	..	..	..	....	....	..	..	..	....	....	73	86	,,	Ditto.	Ditto.
31	..	..	..	....	....	..	..	..	....	....	70	88	,,	Ditto.	Ditto.
Total.	10.75	1124.5	..	....	....	94.8	11.10	..	. ..	....	1783.5	2125.5	..	....	....
....	....	....	..	....	....	....	....								

3 P. M.					Sunset.					9 P. M.					
Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Remarks.
Wet.	Dry.				Wet.	Dry.				Wet.	Dry.				
72.5	84	..	N. E. lt.	Cirri.											
71	87	..	Ditto.	Ditto.	70	75	..	N. E. lt.	Cirri.						
72	88	..	Ditto.	Ditto.	70	80	..	E.	Clear.	64	70	N. E.	Light.	Rain.	Decrease Fog.
68	85	..	Ditto.	Ditto.	..	79	..	Calm.	Ditto.	65	73	Do.	Ditto.	Ditto.	Hazy.
..	..	..	N. W.	..	..	..	..	..	..	..	..	..	..	..	Ditto.
68	88	..	Ditto.	Cirri.	70	81	..	Calm.	Clear.	76	74	N. W.	Light.		
68	86	..	Ditto.	Cloudy.											
70	87	..	Ditto.	C.-cum.	..	..	..	..	..	70	78	N. W.	Light.	..	Hazy in Evening.
71	90.5	..	Ditto f.	Ditto.	..	..	..	..	..	70	79	Do.	Ditto.		
73	89	..	Ditto.	Cloudy.	72	82	..	Calm. }	Close and						
..	..	..	....	..	70	76	..	Ditto. }	sultry.	..	..	..	..	..	Cool.
70	89	..	Ditto.	Cloudy.	..	..	..	..	..	66	72	N. W.	Cloudy.		
73	88	..	Ditto.	Ditto.											
73	91.5	..	Ditto.	Ditto.											
74	91	..	Ditto.	Ditto.	..	..	..	..	..	72	79	N. W.	Cloudy.		
73	90	..	Ditto.	Ditto.	..	..	..	..	..	76	77	Do.	Ditto.		
72	90	..	Ditto.	Ditto.	69	82	..	Calm.	Close and						
71	92	..	Ditto.	Ditto.					sultry.						
70	91	..	Ditto f.	Ditto.	..	..	..	..	..	..	..	..	..	..	Shower last night.
..	..	..	....	..	..	..	..	..	..	63	67.5	N.W.f	Cloudy.	..	Light showers, cold, cloudy.
73	87	..	N. E. f.	Cloudy.	..	..	..	..	..	..	..	..	..	..	Light rain last night cold.
73	87	..	N. lt.	Cumuli.	..	..	..	..	..	69	76	N.E lt.	Cirri.		
..	..	..	....	..	69	75	..	N. E. lt.	Clear.	67	74	Do.	Ditto.		
75	91	..	N. W. lt.	Cumuli.											
74	91.5	..	Ditto.	Ditto.											
1504.5	1863.5	..	....	..	49.0	63.0	..	..	..	75.8	819.5				
71.64	88.33	..	....	..	70.00	78.75	..	..	..	68.95	74.5				

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of February 1853.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.465	62.0	62.0	52.0	..	..	W.	Clear.
2	29.419	61.6	61.6	53.5	..	..	Ld.	⌣ in zenith.
3	29.456	63.4	63.0	55.4	..	..	S. E.	\ in zenith.
4	29.403	64.9	64.4	57.0	..	..	E.	∩ scattered.
5	29.526	66.0	66.0	61.4	..	..	S. E.	Clear.
6	29.469	62.0	62.0	56.0	..	..	W.	Ditto.
7	29.490	60.0	60.5	52.5	..	..	W.	Ditto.
8	29.497	61.0	61.5	53.4	..	..	N.	Ditto.
9	29.513	63.4	63.8	54.4	..	..	N.	Ditto.
10	29.475	64.0	64.7	56.5	..	..	W.	Ditto.
11	29.455	65.0	65.0	57.0	..	..	W.	\ a few in zenith.
12	29.449	67.8	68.0	60.0	..	..	E.	Clear.
13	29.417	69.5	71.3	58.5	..	..	N.	\ scattered all over.
14	29.448	69.0	70.0	58.4	..	..	W.	Clear.
15	29.372	69.0	70.0	58.2	..	..	W.	Ditto.
16	29.372	69.7	71.0	58.2	..	..	W.	Ditto.
17	29.358	69.0	70.1	56.5	..	..	N.	\ a very few in zenith.
18	29.421	71.0	70.6	59.0	..	..	S.	∼ scattered.
19	29.523	68.0	69.2	58.9	..	..	N.W.	Clear.
20	29.472	69.0	69.5	59.5	..	..	W.	\ a very few in zenith.
21	29.413	66.6	67.5	56.0	..	..	N.	Clear.
22	29.433	67.3	67.5	55.1	..	..	W.	Ditto.
23	29.449	68.0	69.0	54.5	..	..	W.	∼ scattered.
24	29.482	67.5	69.2	54.5	..	..	W.	\ ditto.
25	29.525	68.0	68.5	54.5	..	..	N.W.	Clear.
26	29.558	66.0	66.9	54.0	..	..	W.	Ditto.
27	29.535	67.0	67.5	52.2	..	..	N.	\ a very few in zenith.
28	29.563	68.0	68.0	55.0	..	..	N.	\ scattered all over.
Mean.	29.456	66.2	66.7	56.2	..	..	..	

Note. The symbols used for Aspect of the sky are

Symbols, ... { \ Cirrus. ⌣ Cirro-strati. ∩ Cumuli. ∼ Cumulo-strati. ⌇ Nimbi or Nimbus.

The Barometer readings have all been reduced to 32° Farh. and corrected for Capillary Action.

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of Feb. 1853. LATITUDE.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.406	65.8	64.6	54.2	..	..	W.	Clear.
2	29.374	63.0	62.2	53.9	..	..	S.	⌐ in zenith.
3	29.407	64.0	63.0	55.0	..	..	S.	\ ditto.
4	29.345	65.4	64.7	57.4	..	..	S.	∩ a few scattered.
5	29 257	67.4	67.4	61.7	..	..	S.	∩ scattered.
6	29.447	63.9	64.0	55.5	..	..	W.	Clear.
7	29.403	64.0	64.5	52.5	..	..	N.	\ in zenith.
8	29.421	64.0	64.0	55.0	..	..	S.	Clear.
9	29.450	66.0	66.8	56.5	..	..	S.W.	Ditto.
10	29.422	66.5	67.5	57.5	..	..	W.	Ditto.
11	29.411	68.0	68.9	56.7	..	..	W.	\ a few in zenith.
12	29.368	70.0	70.1	59.0	..	..	S.	Clear.
13	29 357	73.7	76.0	58.9	..	..	N.W.	\ scattered all over.
14	29 382	72.0	72 5	59.0	..	..	N.W.	Clear.
15	29.327	74.0	74.5	59.4	..	..	N.W.	Ditto.
16	29.312	73.0	74.5	59.4	..	..	N.	Ditto.
17	29 326	72.2	73.2	57.5	..	..	N.W.	\ a very few in zenith.
18	29.391	72.5	74.0	60.5	..	..	S.	∩ towards horizon.
19	29.480	72.0	72.0	60.3	..	..	N.	Clear.
20	29.432	72.0	70.2	56.5	..	..	N.	Ditto.
21	29.358	70.5	71.6	56.5	..	..	S.	Ditto.
22	29.370	70.0	70.5	56.5	..	..	N.W.	Ditto.
23	29.411	71.0	72.0	55.0	..	..	N.	∩ scattered.
24	29.437	71.0	71.9	54.1	..	..	S.	\ a very few scattered.
25	29.470	70.0	70.4	54.9	..	..	S.	Clear.
26	29.532	69.9	69.0	55.5	..	..	W.	Hazy.
27	29.490	70.4	70.4	54.0	..	..	N.	\ scattered.
28	29.546	69.6	67.0	55.0	..	..	N.	⌐ scattered all over.
	29.405	69.0	69.2	56.7	..	..	..	

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of Feb. 1853. LONGITUDE.

Maximum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.	Rain Gauges.		
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.		3 Feet 2 Inches from the ground.	Direction of the Wind.	
1	29.352	69.0	70.0	56.5	68.3	55.5	61.9	Clear.	..	W.	
2	29.287	65.0	63.7	54.2	63.4	56.0	59.7	⌣ in zenith.	..	N.	
3	29.333	65.0	64.3	55.9	64.0	59.0	61.5	Ditto.	..	N.	
4	29.260	68.6	68.0	60.0	67.5	62.0	64.75	∩ a few scattered.	..	N.W.	
5	29.182	68.1	68.0	63.5	67.5	62.0	64.75	⌣ all over.	..	E.	Hail.
6	29.422	66.0	65.5	57.5	65.0	58.5	61.75	Clear.	26.4	N.	
7	29.376	66.0	66.0	55.5	65.3	56.0	60.15	Ditto.	..	N.	
8	29.373	67.0	67.0	56.5	66.3	56.0	61.15	Ditto.	..	N.	
9	29.403	68.5	67.5	57.8	68.5	58.0	63.25	Ditto.	..	W.	
10	29.353	71.0	71.5	58.5	70.2	58.9	64.55	Ditto.	..	N.	
11	29.353	71.3	71.3	58.1	70.6	60.0	65.3	⌣ scattered.	..	W.	
12	29.307	73.7	74.1	59.5	72.3	64.0	68.15	Clear.	..	s.w.	
13	29.278	77.5	77.6	60.6	76 0	63.5	69.75	⌣ scattered all over.	..	W.	
14	29.317	78.0	78.0	61.1	76.5	63.0	69.75	Clear.	..	N.	
15	29.307	77.0	77.5	60.8	76.2	63.0	69.6	Ditto.	..	W.	
16	29.236	76.6	76.8	60.1	75.2	63.0	69.1	Ditto.	..	N.	
17	29.266	73.5	73.5	59.3	72.6	63.0	67.8	∩ scattered.	..	N.	
18	29.326	75.5	75.9	61.1	74.8	67.8	71.3	∩ a very few in zenith.	..	S.	
19	29.397	75.5	76.7	59.5	75.0	62.2	67.6	Clear.	..	N.	
20	29.333	75.0	75.0	58.0	73.3	63.0	68.15	Ditto.	..	N.	
21	29.275	74.0	74.0	57.5	73.0	60.0	66.15	\ scattered in zenith	..	N.	
22	29.297	74.0	74.4	57.6	73.0	60.0	66.5	Clear.	..	W.	
23	29.368	73.5	75.2	55.5	74.0	60.0	67.0	\ scattered.	..	N.	
24	29 375	75.5	77.1	55.2	75.0	59.0	67.0	Clear.	..	N.	
25	29.396	73.0	73.9	58.1	72.3	60.0	66.15	Ditto.	..	E.	
26	29.421	71.0	70.5	57.6	70.0	59.3	64.65	Ditto.	..	N.	
27	29.425	74.0	73.6	56.2	72.0	58.3	65.15	\ scattered.	..	N.	
28	29.458	72.7	72.7	56.4	71.5	62.6	67.05	⌣ scattered all over.	..	N.	
	29.338	72.0	72.1	58.1	71.0	60.5	65.75		42.6		

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of March, 1853.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.593	65.0	67.0	50.5	..	..	N W.	Clear.
2	29.520	66.0	66.8	54.0	..	..	W.	Ditto.
3	29.482	67.5	67.8	54.2	..	..	W.	Ditto.
4	29.396	67.5	68.4	54.8	..	..	W.	Ditto.
5	29.356	70.0	70.4	57.4	..	..	W.	Ditto.
6	29.281	73.5	75.0	61.0	..	..	S.	Ditto.
7	29.406	76.6	74.2	63.1	..	..	E.	∩ scattered all over.
8	29.387	75.0	74.9	64.7	..	..	s.w.	Clear sky.
9	29.421	74.0	74.6	62.4	..	..	N.	Clear.
10	29.506	70.0	71.8	59.7	..	..	N.	Ditto.
11	29.480	73.0	73.5	57.0	..	..	W.	Hazy.
12	29.355	71.0	71.5	59.0	..	..	N.	Ditto.
13	29.382	73.0	73.5	65.0	..	..	Ld.	∿ all over.
14	29.430	72.0	73.0	63.3	..	..	W.	Clear.
15	29.443	71.0	71.7	59.5	..	..	N W.	Ditto.
16	29.436	73.0	74.7	60.7	..	..	N W.	\ towards S.
17	29.407	73.5	74.5	63.5	..	..	N W.	\ few in zenith.
18	29.441	74.0	75.5	60.3	..	..	W.	Clear.
19	29.437	75.0	75.9	61.3	..	..	N W	Ditto.
20	29.364	82.0	82.7	63.5	..	..	W.	Ditto.
21	29.345	78.0	80.2	63.5	..	..	N W.	Ditto.
22	29.323	81.5	86.0	65.6	..	..	S.W.	Ditto.
23	29.338	78.8	81.5	62.6	..	..	W.	Ditto.
24	29.265	79.8	80.0	62.6	..	..	W.	Ditto.
25	29.219	77.0	77.7	63.9	..	..	W.	\ in horizon to S.
26	29.247	81.5	83.8	64.0	..	..	S. E.	∩ in zenith.
27	29.301	82.0	82.0	66.5	..	..	W.	∩ ditto.
28	29.290	82.8	84.5	66.6	..	..	S.W.	∩ scattered.
29	29.285	84.0	84.9	68.4	..	..	N.	Clear.
30	29.305	84.5	85.0	70.5	..	..	N W.	∿ all over.
31	29.354	79.3	79.8	70.0	..	..	N W.	Clear.
Mean.	29.380	75.15	76.54	61.91	..	..	..	

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of March, 1853. LATITUDE.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.552	68.9	70.5	53.5	..	..	N.W.	Clear.
2	29.472	70.0	71.2	55.0	..	..	N.W.	Ditto.
3	29.443	71.0	71.5	55.0	..	..	N.	Ditto.
4	29.358	70.5	71.2	55.3	..	..	N.W.	Ditto.
5	29.310	72.0	72.5	58.4	..	..	N.	Ditto.
6	29.241	76.0	77.9	63.5	..	..	S.	Ditto.
7	29.401	75.6	75.6	63.9	..	..	E.	~ in horizon to N.
8	29.352	76.0	77.0	65.1	..	..	S.W.	Clear sky.
9	29.394	75.9	76.6	61.5	..	..	N.	Clear.
10	29.490	73.1	74.1	58.6	..	..	N.	Ditto.
11	29.430	73.6	73.9	57.0	..	..	W.	Hazy in horizon.
12	29.312	73.1	74.0	59.6	..	..	N.	— all over.
13	29.349	75.0	75.0	65.4	..	..	S.	~ all over.
14	29.413	74.9	75.4	61.2	..	..	W.	Clear.
15	29.405	74.0	75.4	60.2	..	..	N.	Ditto.
16	29.406	76.0	75.0	61.9	..	..	N.W.	\ few in zenith.
17	29.382	76.0	74.9	62.6	..	..	N.W	Clear.
18	29.407	78.0	79 6	61.4	..	..	W.	Ditto.
19	29.404	77.5	76.6	62.0	..	..	N.W.	Ditto.
20	29.305	84.5	85.0	65.5	..	..	W.	Ditto.
21	29.327	80.0	79.5	64.0	..	..	N.W.	Ditto.
22	29.279	81.0	79.0	65.0	..	..	W.	Ditto.
23	29.314	82.1	80.5	63.4	..	..	W.	Ditto.
24	29.233	83.8	81.6	63.8	..	..	W.	Ditto.
25	29.203	80.9	80.5	64.6	..	..	W.	~ few scattered.
26	29.194	83.0	81.8	65.3	..	..	E.	~ scattered.
27	29.268	82.8	82.6	67.0	..	..	W.	∩ in zenith.
28	29.195	84.2	83.6	67.5	..	..	W.	..
29	29.240	86.0	86.9	69.0	..	..	N.	Clear.
30	29.308	85.0	85.0	72.0	..	..	N.	\~ all over.
31	29.300	82.8	82.9	70.0	..	..	N.W.	Clear.
	29.345	77 52	77.64	62.52	..	..	..	

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of March, 1853. LONGITUDE.

Maximum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.	Rain Gauges.	
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.		3 Feet 2 Inches from the ground.	Direction of the Wind.
1	29.472	73.0	73.3	55.2	72.0	54.5	63.25	Clear.	..	N.W.
2	29.384	74.5	75.5	57.3	74.0	58.0	66.0	Ditto.	..	N.W.
3	29.351	74.0	74.0	56.9	72.6	60.3	66.45	Ditto.	..	N.
4	29 260	72.7	72.7	57.1	72.0	60.5	66.25	Ditto.	..	N.
5	29.174	75.5	76.0	60.2	74.9	65.0	69.95	Ditto.	..	N.
6	29.168	81.5	83.2	65.3	81.5	65.0	73.25	~ a few scattered.	..	S.E.
7	29.370	76.0	75.5	63.6	75.0	65.6	70.3	⌒ a few scattered.	..	E.
8	29.273	80.0	79.5	64.9	78.6	68.9	73.75	Clear sky.	..	W.
9	29.322	79.0	79.6	61.0	78.9	66.5	72 7	Ditto.	..	W.
10	29.393	74.9	74.4	59.0	73.6	63.5	68.55	~ $\frac{1}{3}$ heavens.	..	N.
11	29.354	76.2	76.6	58.9	76 0	61.9	68.95	Clear.	..	W.
12	29.214	76.0	76.0	59.9	75.2	61.7	68.45	_ all over.	..	Ld.
13	29.292	78.5	79.3	67.4	78.0	71.0	74.5	~ all over.	..	S.W.
14	29.355	75.0	74.5	61.6	73.6	66.3	69.95	Clear.	..	W.
15	29.324	78.5	78.5	61.7	77.5	64.9	71.2	Ditto.	..	N.
16	29.326	76.0	75.6	62.5	76.2	67.0	71.6	Ditto.	..	N.
17	29.300	76.0	81.0	63.1	76 0	67.0	71.5	Ditto.	..	W.
18	29.331	81.0	82.0	61.9	80.5	67.0	73.75	Ditto.	..	W.
19	29.311	77.2	77.6	62.8	77.2	69.0	73.1	Ditto.	..	N.W.
20	29.204	85.7	86.0	66.0	85.5	70.5	78.0	Ditto.	..	W.
21	29.203	82.4	85.0	65.9	82.0	71.5	76.75	\ a few scattered.	..	W.
22	29.189	83.5	85.4	66.9	85.0	74.7	79.85	Clear.	..	W.
23	29.224	86.0	89.5	65.0	88.0	74.0	81.0	Ditto.	..	W.
24	29.147	84.0	90.5	65.0	85.5	73.8	79.65	Ditto.	..	W.
25	29.105	82.0	82.3	64.6	86.8	78.9	82.85	Few ~scattered.	..	W.
26	29.128	86.1	86.1	65.8	86.8	75.6	81.2	~ in zenith.	..	E.
27	29.156	86.0	86.4	69.2	85.5	75.5	80.5	~ scattered.	..	N.W.
28	29.161	87.5	94.4	68.5	92.6	78.9	85.75	Clear.	..	W.
29	29.133	93.9	94.9	71.0	93.0	79.5	86.25	⌒ in zenith.	..	N.
30	29,262	84.8	84.4	72.9	85.0	81.5	83.25	\~ all over.	..	N.W.
31	29.201	84.0	87.5	78.0	84.0	71.0	77.5	Clear.	..	N.
	29.261	80.05	81.19	63.84	86.55	68.68	77.61		..	..

JAS. MUIR, *Asst. Secy. to Govt. N. W. P.*